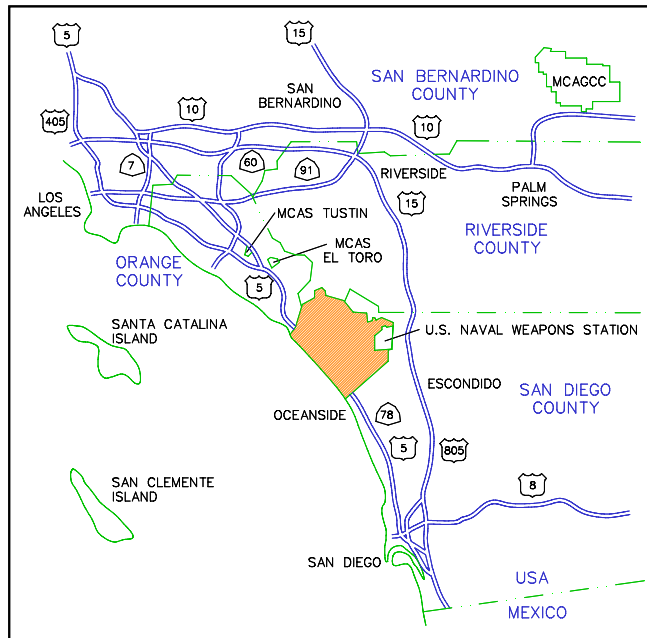


Closure Report
for the 43 Area Morale, Welfare, and Recreation (MWR)
Gas Station Site 43286
(Includes: Documentation of Verification Soil Sampling)
Marine Corps Base Camp Pendleton



Prepared for



NAVAL FACILITIES
ENGINEERING SERVICE CENTER
1100 23rd Avenue
Port Hueneme, California 93043

NAVFAC SOUTHWEST
1220 Pacific Highway
San Diego, California 92132-5190

CONTRACT NUMBER: N47408-01-D-8207

TASK ORDER: 0115

by

Battelle

**Environmental Restoration
Department**

**505 King Avenue
Columbus, Ohio 43201-2693**

April 2006

**Closure Report for the 43 Area Morale,
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**Naval Facilities Engineering Service Center
1100 23rd Avenue
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and

**Naval Facilities Engineering Command Southwest
1220 Pacific Highway
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Prepared by:

**BATTELLE
505 King Avenue
Columbus, Ohio 43201**

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Approved: _____

Robert J. Janosy
Robert Janosy, P.G.
Battelle Memorial Institute
Project Manager/Geologist



25 APRIL 06

Date

CONTENTS

Section 1.0: INTRODUCTION	1
1.1 Objectives	1
1.2 Site Background and Location.....	1
Section 2.0: SITE ENVIRONMENTAL ACTIVITIES.....	3
2.1 UST Removal	3
2.2 Site Assessment and Well Installation.....	3
2.3 IAS/SVE Remediation System	3
2.4 Groundwater Monitoring/Verification Groundwater Sampling	4
2.5 Surface Water Study	4
2.6 Verification Soil Sampling	5
Section 3.0: CLEANUP OBJECTIVES.....	7
3.1 Soil Cleanup Goals	7
3.2 Groundwater Cleanup Goals.....	7
Section 4.0: ASSESSMENT OF IMPACTS.....	8
4.1 Nature and Extent of Contamination	8
4.1.1 Soil	8
4.1.2 Groundwater.....	8
4.1.3 Surface Water.....	8
4.1.4 Nonaqueous-Phase Liquids	8
4.2 Site Geology	9
4.3 Site Hydrogeology	9
4.4 Evaluation of Potential Impact to Water Resources	9
Section 5.0: SUMMARY	12
Section 6.0: REFERENCES	13
Appendix A: DOCUMENTATION OF IAS/SVE SYSTEM REMOVAL	
Appendix B: DOCUMENTATION OF VERIFICATION SOIL SAMPLING	

FIGURES

Figure 1.	Site Assessment and Mitigation Process Flowchart
Figure 2.	Site 43286 Vicinity Map
Figure 3.	Site 43286 Location Map
Figure 4.	Site 43286 Site Map
Figure 5.	Site 43286 Quarterly Groundwater Sample Results
Figure 6.	Site 43286 Verification Soil Sample Results

TABLES

Table 1.	Summary of Site 43286 Environmental Activities
Table 2.	Site 43286 Soil and Groundwater Cleanup Goals

ABBREVIATIONS AND ACRONYMS

AC/S ES	Assistant Chief of Staff, Environmental Security
amsl	above mean sea level
BTEX	benzene, toluene, ethylbenzene, and total xylenes
btoc	below top of casing
CAP	Corrective Action Plan
CME	Central Mine Equipment
COC	contaminant of concern
CSWRCB	California State Water Resources Control Board
DEH	(San Diego County) Department of Environmental Health
DVE	dual vacuum extraction
EHS	Environmental Health Services
GAC	granular activated carbon
HSA	hollow-stem auger
IAS	in situ air sparging
ID	identification
LNAPL	light nonaqueous-phase liquid
LOP	local oversight program
LUFT	Leaking Underground Fuel Tank
MCB	Marine Corps Base
MCL	maximum contaminant level
MTBE	methyl- <i>tert</i> -butyl ether
MWR	morale, welfare, and recreation
NAVFAC	Naval Facilities Engineering Command
ND	non-detect
NFESC	Naval Facilities Engineering Service Center
NIRIS	Navy Installation Restoration Information Solution
OHM	OHM Remediation Services, Inc.
PRG	preliminary remediation goal
RAP	Remedial Action Plan
RPM	Remedial Project Manager
RWQCB	Regional Water Quality Control Board, San Diego Region
SAM	site assessment and mitigation
SPLP	synthetic precipitation leaching procedure
SVE	soil vapor extraction

TMB	trimethylbenzene
TPH-D	total petroleum hydrocarbons extractable as diesel
TPH-G	total petroleum hydrocarbons purgeable as gasoline
TPH-MO	total petroleum hydrocarbons extractable as motor oil
UST	underground storage tank
VAP	voluntary assistance program

Section 1.0: INTRODUCTION

This Closure Report was prepared for the Department of Navy, Naval Facilities Engineering Command (NAVFAC) Southwest under Task Order No. 0115 of the United States Naval Facilities Engineering Service Center (NFESC) Contract No. N47408-01-D-8207. The Closure Report addresses the 43 Area Morale, Welfare, and Recreation Gas Station (Site 43286), located at Marine Corps Base (MCB) Camp Pendleton.

1.1 Objectives

The objectives of the Closure Report are as follows:

- Document verification soil sampling activities and results.
- Summarize previous environmental activities conducted at Site 43286.
- Meet the requirements of the Regional Water Quality Control Board, San Diego Region (RWQCB) and the San Diego County Department of Environmental Health (DEH) for the submittal of a Closure Report.
- Provide a recommendation of no further action for the site.

Site 43286 is regulated under the California State Water Resources Control Board's Leaking Underground Fuel Tank (LUFT) program (CSWRCB, 1989) as administered by the RWQCB. The document guiding the assessment, remediation, and closure process at the site is the *Site Assessment and Mitigation (SAM) Manual* (DEH, 2004). Figure 1 is a flowchart that summarizes the site assessment and mitigation process in San Diego County. Currently, Site 43286 is in the post-remedial monitoring process.

The following subsections of Section 1.0 describe the site background and location. Section 2.0 presents a summary of the environmental activities performed at Site 43286, which includes underground storage tank (UST) removal, site assessment and well installation, operation of the in situ air sparging/soil vapor extraction (IAS/SVE) remediation system, groundwater monitoring, surface water study, and verification soil sampling. Section 3.0 summarizes the cleanup objectives for the Site 43286, and Section 4.0 is an assessment of impacts at the site. Section 5.0 summarizes the report and makes a recommendation, and Section 6.0 lists references cited in the report. Appendix A contains documentation of IAS/SVE system removal, and Appendix B contains documentation of the verification soil sampling.

1.2 Site Background and Location

The following list summarizes the site identification data:

Site Address:	Buildings 43286 and 43287, 43 Area Camp Pendleton, CA 92055
Facility Name:	Morale, Welfare, and Recreation (MWR) Gas Station
Environmental Health Services (EHS) Case No:	H05939-095
Assessor's Parcel No.:	101-000-00
RWQCB Case No:	SMC: 50-2962.05

Property Owner:	United States Marine Corps
Tank Owner:	United States Marine Corps
Tank Operator:	United States Marine Corps
MCB Contact:	Mr. Chet Storrs Assistant Chief of Staff Environmental Security (AC/S ES) Building 22165 Camp Pendleton, CA 92055-5008 (760) 725-9774
Remedial Project Manager (RPM):	Herb Doughty NAVFAC Southwest, Code OPCE.HD 1220 Pacific Highway San Diego, CA 92132-519 (619) 532-4714
Responsible Party:	United States Marine Corps

MCB Camp Pendleton is located in northern San Diego County, CA, and covers approximately 125,000 acres of land bordered on the west by the Pacific Ocean. Site 43286 is an active gasoline station located in the center portion of MCB Camp Pendleton on Las Pulgas Road. The site is located within the Las Flores Groundwater Basin; however, the nearest downgradient drinking water well is more than 4 miles from the site. The site is bounded by undeveloped land to the north and south, Las Flores Creek to the east, and Las Pulgas Road to the west. Figure 2 is an area map showing the location of MCB Camp Pendleton and Site 43286. Figure 3 is a location map of the 43 Area identifying Site 43286, and Figure 4 is a site map of Site 43286.

Section 2.0: SITE ENVIRONMENTAL ACTIVITIES

This section summarizes the environmental activities conducted at the Site 43286 from 1993 to present. A detailed chronology of site environmental activities is presented in Table 1.

2.1 UST Removal

In October 1993, two 10,000-gallon gasoline USTs and one 550-gallon waste oil tank were removed from the site. The release history and the total volume of fuel hydrocarbons released to the subsurface are unknown.

2.2 Site Assessment and Well Installation

In 1994, nine borings (B1-B9) and three groundwater monitoring wells (43286-MW01, 43286-MW02, and 43286-MW03) were installed and sampled as part of the initial site assessment (IT Corp., 1994). This assessment indicated that soil and groundwater at the site had been impacted by a release of fuel hydrocarbons. Analytical results showed that total petroleum hydrocarbons quantified as gasoline (TPH-G) and benzene were present in Site 43286 soil at concentrations of 5,300 mg/kg and 2 mg/kg, respectively. In addition, groundwater was found to be impacted with TPH-G, benzene, toluene, ethylbenzene and xylenes at 48,000 µg/L, 3,060 µg/L, 11,400 µg/L, 1,080 µg/L, and 6,550 µg/L, respectively. In August and September 1995, an additional boring (B10) was advanced, and an additional groundwater monitoring well (43286-MW04) was installed (OHM, 1995). Aquifer pump testing, soil vapor extraction (SVE), and dual vacuum extraction (DVE) pilot-scale testing was performed in September and October of the same year (OHM, 1996).

During March and April 1997, nine additional borings (HP-1 through HP-9) and four groundwater monitoring wells (43286-MW01A, 43286-MW05A, 43286-MW05B, and 43286-MW06) were installed and sampled at Site 43286. In addition, hand-augered borings were taken in the Las Flores Creek embankment, and temporary stream channel piezometers were installed in the Las Flores Creek (OHM/M&E, 1997).

2.3 IAS/SVE Remediation System

In 1998, Battelle installed a remediation system consisting of in situ air sparging with soil vapor extraction (Battelle, 1998a) and field design testing activities were conducted from December 11, 1998 through January 19, 1999. Full-scale operation of the system began on February 19, 1999, and continued until August 4, 2000. Monitoring wells 43286-MW07A and 43286-MW07B were installed as part of this effort.

During operation of the IAS/SVE system, contaminant removal was significant. Approximately 572 lb of petroleum hydrocarbons were removed by the SVE system and treated on-site by either a thermal oxidizer or granular activated carbon (GAC) system. Samples collected from the monitoring wells located in the most impacted areas (i.e., 43286-MW01A, 43286-MW04, and 43286-MW07B) showed between 95.8 and 99.8% removal of all contaminants of concern (COCs) (Battelle, 2001).

From August 2000 until August 2001, the IAS/SVE system was not in operation and post-operation quarterly groundwater monitoring was initiated to determine whether contaminant rebound would occur. In 2002, Battelle removed the IAS/SVE system and abandoned the IAS/SVE system wells after receiving approval from the RWQCB, as contaminant concentrations from all site wells during the

four quarterly groundwater monitoring events were stable or decreased (Battelle, 2002; RWQCB 2002). Copies of the IAS/SVE well, soil-gas monitoring point, and piezometer destruction diagrams documenting the system removal are provided in Appendix A.

2.4 Groundwater Monitoring/Verification Groundwater Sampling

From September 1995 to July 2005, twenty-nine (29) groundwater monitoring events were conducted and reported for Site 43286 (OHM, 1997; Battelle, 1998b, Battelle, 1999, 2000a, 2001a, 2001b, 2001c, 2002, 2003a, 2004, 2005). All ten site wells were installed by late 1998 and monitored by Battelle. Nine piezometers located in the Las Flores streambed were added to the quarterly groundwater monitoring network and sampled from May 1999 to November 2000. All groundwater monitoring events conducted after the IAS/SVE system was shut down is considered verification groundwater sampling.

Seven quarters of groundwater monitoring were conducted by OHM from September 1995 to July 1997 (OHM, 1997). Battelle resumed groundwater monitoring activities at Site 43286 and performed quarterly events from February 1998 to August 2000 (Battelle, 1999, 2000a, 2001a). After the IAS/SVE system was shutdown on August 4, 2000, Battelle conducted verification groundwater sampling for one year (November 2000, February 2001, April 2001, and July 2001) to evaluate the potential for contaminant rebound (Battelle, 2001a, 2001b, 2001c). In 2002, after groundwater monitoring suggested that no significant rebound was occurring (Battelle, 2001c), the RWQCB requested that groundwater monitoring be conducted semiannually for two years (RWQCB, 2002).

Battelle resumed verification groundwater sampling and conducted semi-annual monitoring for two years (July 2002, January 2003, July 2003, and January 2004) as recommended by the RWQCB (Battelle 2002, 2003a, 2004). In January 2005, the RWQCB requested that a minimum of two additional groundwater monitoring events be conducted during the 1st and 2nd quarters 2005 with the intention of capturing possible high groundwater levels that might be present at the site (from historically dry wells) due to the significant winter 2004 rainfall (RWQCB, 2005a). Although the RWQCB recommended sampling during the 1st and 2nd quarters 2005, actual field activities could not commence until the 2nd quarter 2005 (Battelle, 2005). Figure 5 presents the groundwater results for the last four monitoring events conducted at the site.

2.5 Surface Water Study

Las Flores Creek is located adjacent to Site 43286 with the main channel of the creek located approximately 200 ft east of the site. In order to evaluate the impact of the gasoline release from Site 43286, surface water and groundwater sampling was performed at Las Flores Creek in 1999 (Battelle, 2000b). Results from the study indicated the presence of an upward vertical hydraulic gradient, which suggested the creek was gaining (i.e., groundwater contributes to the stream flow).

The groundwater beneath the creek was sampled from nine piezometers which were installed to the east/southeast of Site 43286 within the bed of the Las Flores Creek. The piezometers were sampled three times from May 1999 through November 1999 (Battelle, 2000b). Initially, methyl-*tert*-butyl ether (MTBE) and xylenes were detected in piezometers at maximum concentrations of 88 µg/L and 0.5 µg/L, respectively. The final piezometer sampling event occurred in November 2000, roughly one year after the IAS/SVE system had been initiated. During this event, MTBE and xylenes were detected at maximum concentrations of 6.3 µg/L and 1.1 µg/L, respectively. The decreased concentrations of MTBE located downgradient of Site 43286 was attributed to the effectiveness of the IAS/SVE system. The IAS/SVE system drastically reduced the concentrations of COCs in groundwater within the system's radius of influence, effectively removing the source of contamination in groundwater.

Surface water was sampled three times from August 1999 to February 2000 in the Las Flores Creek and results indicated that surface water had been impacted by benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents at low concentrations, which were below cleanup goals for groundwater (Battelle, 2000b). The first sampling events took place in August 1999, roughly six months after the initiation of the IAS/SVE system. Very low levels of BTEX constituents (benzene, toluene, and xylenes at 0.61, 0.5, and 0.5 µg/L, respectively) were detected in the first sampling event. The two subsequent events occurred in November 1999 and February 2000, roughly nine months and one year after initiating the system; no COCs were detected in either of these sampling events.

Findings of the study concluded that Site 43286 currently poses minimal threats to surface water and groundwater downgradient of the site. Concentrations of groundwater in the source area have been reduced to levels below the groundwater cleanup goals. Furthermore, sampling performed concurrently with the IAS/SVE system indicated that COCs downgradient of Site 43286 have decreased to concentrations below cleanup goals in the creek bed piezometers, and to non-detectable levels in the Las Flores Creek surface water.

Four additional quarters of surface water and groundwater sampling at Las Flores Creek were continued from February 2000 to November 2000 as part of the verification/groundwater monitoring effort (Battelle, 2001a).

2.6 Verification Soil Sampling

As part of the post-corrective action process, verification soil sampling was conducted at Site 43286. The *Work Plan for Soil Verification Sampling at Site 43286, Marine Corps Base Camp Pendleton* was submitted after groundwater monitoring (verification groundwater sampling) suggested that contaminant rebound was not occurring following shutdown of the IAS/SVE system (Battelle, 2003b). Currently, ten post-IAS/SVE groundwater monitoring events, which constitute the verification groundwater sampling, have been conducted with no reported contaminant rebound.

Verification soil sampling was conducted on December 2, 2005 as outlined in the work plan (Battelle, 2003b). Soil sampling was performed at locations within identified contaminated areas and the IAS/SVE radius of influence. Sampling locations were surveyed on-site with a hand-held GPS unit. No boring permit with DEH was necessary because all boreholes were advanced less than 20 ft and no groundwater was encountered. Documentation of the verification soil sampling effort is presented in Appendix B, including copies of the analytical report, associated data validation packets, and survey plot.

In all, four soil samples (43286-SV1 through 43286-SV4) were collected from 13 to 16.5 ft bgs using a Central Mine Equipment (CME)-75 hollow-stem auger (HSA) and analyzed for TPH-G, BTEX, and MTBE. Figure 6 presents the locations of the verification soil samples as well as the analytical results. In two of the four verification soil samples (43286-SV2 and 43286-SV3), TPH-G, BTEX, and MTBE were not detected at levels above reporting limits. Minor detections of TPH-G, ethylbenzene, and xylenes were reported at 7 mg/kg, 18 µg/kg, and 15 µg/kg, respectively, from 43286-SV1. TPH-G was detected in 43286-SV4 at 39 mg/kg. Synthetic Precipitation Leaching Procedure (SPLP) testing was performed on 43286-SV1 for BTEX and MTBE, and none of the compounds analyzed for were measured at detectable levels. All boreholes were properly grouted with Portland cement.

In accordance with Assembly Bill 2886 (Water Code Sections 13195-13198), Battelle has completed an electronic data format upload for Site 43286 via the Internet to CSWRCB's GeoTracker System. For this closure report, soil laboratory data from the soil verification samples, location data (i.e.,

location of soil borings), and a site map were submitted. Electronic data uploads included the following major activities:

1. Obtaining a unique Global Identification (ID) for each site.
2. Uploading a list of “Field_Point_Names” to GeoTracker.
3. Providing the Global ID and Field Point Names to the analytical laboratory on the chain of custody.
4. Ensuring that the field point names, Global ID, and all laboratory data were correct within each electronic submission file.
5. Submitting electronic compliance data via the GeoTracker Internet site.

The data submittal for the December 2005 verification soil sampling as well as an electronic copy of this report have been uploaded to the GeoTracker Web site. In addition, the soil data will be entered into the Navy Installation Restoration Information Solution (NIRIS) database as described in current Environmental Work Instruction #6 (Environmental Data Management and Required Electronic Delivery Standards). Data will be compiled with spatial and temporal qualifiers so that it will be possible to rapidly plot the concentration of target analytes at each sampling point.

Section 3.0: CLEANUP OBJECTIVES

Soil and groundwater cleanup goals were established as part of the Corrective Action Plan (CAP) (OHM, 1998). Corrective action activities at Site 43286 were conducted to address the groundwater contamination resulting from gasoline releases. A combination of both UST removal and the operation of an IAS/SVE system were implemented with the intent to remove and/or destroy virtually mobile contamination (and sources of contamination) in the subsurface to meet soil and groundwater cleanup goals.

A dual cleanup standard for soil has been accepted, and remediation will be considered successful if confirmation soil samples from previously contaminated zones contain non-detectable concentrations of leachable BTEX and MTBE (using SPLP test), or if their total concentrations are less than the values listed in Table 2. These thresholds define concentrations in soil that pose minimal risk to underlying groundwater resources, and are reflective of current drinking water maximum contaminant levels (MCLs) (California Code of Regulations, 2003).

The IAS/SVE system implemented at this site was intended to address the area of shallow, unsaturated soils and groundwater that exceed the cleanup criteria. It has been established that groundwater levels are below cleanup goals and that rebound is not occurring.

3.1 Soil Cleanup Goals

The *Final Remediation Work Plan for the 43 Area Morale, Welfare, and Recreation (MWR) Gas Station, Marine Corps Base Camp Pendleton* outlined that soil remediation be considered successful if soil verification samples from previously contaminated zones contain leachable concentrations (using the SPLP test) of BTEX and MTBE below groundwater MCLs (Battelle, 1998a) (Table 2). Analytical results (including SPLP) from the soil verification samples indicate that soil cleanup goals have been met at Site 43286.

3.2 Groundwater Cleanup Goals

As stated in the revised final remediation work plan (Battelle, 1998a), groundwater cleanup areas are defined by the presence of BTEX and MTBE concentrations that exceed groundwater cleanup goals as observed during the site assessment activities. Site-wide groundwater monitoring has been conducted at Site 43286 since September 1995, and sufficient data show that the IAS/SVE system has been effective at reducing contaminant concentrations in groundwater. The system was shut down in August 2000 and put on standby status while groundwater monitoring (verification groundwater sampling) continued for contaminant rebound.

As reported from the last groundwater sampling event (July 2005), detectable concentrations of BTEX, MTBE, TPH-G, total petroleum hydrocarbons quantified as diesel (TPH-D), 1,2,4-trimethylbenzene (1,2,4-TMB), and 1,3,5-TMB have consistently decreased in historically contaminated wells and are currently below cleanup goals (Table 2).

Section 4.0: ASSESSMENT OF IMPACTS

This section describes the current nature and extent of contamination at Site 43286, the regional and site geology and hydrogeology, and a screening to determine whether the site has the potential to meet the criteria required for a low-risk fuel-contaminated site (RWQCB, 1996). An assessment of the impacts at Site 43286 is presented by using the guidelines outlined in the *California Underground Storage Tank Regulations* (California Code of Regulations, 2000).

4.1 Nature and Extent of Contamination

The current nature and extent of contamination in soil, groundwater, and surface water are discussed in the following subsections.

4.1.1 Soil. Verification soil samples collected at Site 43286 indicated that only minor residual soil contamination exists at the site. Detectable concentrations of targeted compounds were present only in 43286-SV1 and 43286-SV4. In 43286-SV1, TPH-G, ethylbenzene, and xylenes were detected at 7 mg/kg, 18 µg/kg, and 15 µg/kg, respectively; and in 43286-SV4, TPH-G was detected at 39 mg/kg. The detected concentrations of ethylbenzene and xylenes were below the established soil cleanup goals of 68 mg/kg and 175 mg/kg. No cleanup goals have been established for TPH-G.

4.1.2 Groundwater. Verification groundwater samples collected at Site 43286 following shutdown of the IAS/SVE system indicated that only residual groundwater contamination exists at the site. Targeted compounds such as BTEX and MTBE are at levels below cleanup goals. During the 2005 sampling events, MTBE was detected in wells 43286-MW03, 43286-MW05A, and 43286-MW07B at maximum concentrations of 0.71 µg/L, 3.0 µg/L, and 4.5 µg/L, respectively, which are all below the final groundwater cleanup goal of 13 µg/L. Also in 2005, TPH-D was detected in well 43286-MW04 in both the primary and duplicate sample at concentrations of 0.10 mg/L and 0.068 mg/L, respectively, which are at and below the taste and odor threshold value of 0.10 mg/L. This was the first detection of TPH-D in 43286-MW04 since April 2001. TPH-D, TPH-G, ethylbenzene, xylene, MTBE, 1,3,5-TMB, and 1,2,4-TMB were detected in 43286-MW05A at concentrations of 0.13 mg/L, 0.088 mg/L, 0.50 µg/L, 1.2 µg/L, 3.0 µg/L, 2.4 µg/L, and 4.7 µg/L, respectively. The April 2005 sampling event represents the only sampling of 43286-MW05A since February 1998 and was possible only due to groundwater being present in the historically dry well. In 2005, no chemical was detected in groundwater at concentrations greater than the cleanup levels established for Site 43286.

4.1.3 Surface Water. Initial surface water and groundwater analytical results from the 1999-2000 surface water study of the adjacent Las Flores Creek indicated that the creek was impacted with targeted contaminants originating from Site 43286. However, because the study was conducted concurrently with the operation of the IAS/SVE system, concentrations of those target contaminants (BTEX and MTBE) in groundwater beneath the creek and surface water samples were gradually reduced either to non-detectable levels or below groundwater cleanup goals. Findings of the study concluded that Site 43286 currently poses minimal threats to surface water and groundwater downgradient of the site.

4.1.4 Nonaqueous-Phase Liquids. Light, nonaqueous-phase liquid (LNAPL) has not been observed since the IAS/SVE system was shut down in August 2000. Due to the lack of free product, LNAPL is no longer a concern.

4.2 Site Geology

Geologic materials underlying Site 43286 are comprised of unconsolidated fill (sand, clayey silt) and alluvium (interbedded sands, silts, and clays). Fill material generally comprises the uppermost 5 to 15 ft of the subsurface. Asphalt and concrete cover much of the site's surface and are likely to preclude significant vertical recharge from infiltration.

4.3 Site Hydrogeology

Two distinct hydrostratigraphic units appear to exist underneath the site. The upper unit, apparently unconfined, spans the base of the fill to a clay bed, approximately 4 ft thick, which may act as a confining unit on the underlying deeper zone. Differences in water levels between the two zones measured in three well pairs (43286-MW01 and 43286-MW01A, 43286-MW05 and 43286-MW05A, and 43286-MW07 and 43286-MW07A) suggest that the hydraulic head in the lower zone may be 1 to 3 ft higher than in the upper zone. The average depth to groundwater at the site is approximately 15 ft, with observed seasonal fluctuations in groundwater elevation of 2 ft. The groundwater flow direction is towards the southeast.

Site 43286 is located in the Las Flores groundwater basin, with surface drainage directed towards the east. The site lies approximately 200 ft north of Las Flores Creek. A 1999-2000 surface water study determined that site groundwater discharges into the creek (a gaining stream) (Battelle, 2000b).

4.4 Evaluation of Potential Impact to Water Resources

This section discusses the proximity and quality of nearby surface water and groundwater, and the current/potential beneficial uses of this water. Las Flores Creek is the nearest surface water body and is located adjacent to Site 43286 with the main channel of the creek located approximately 200 ft east of the site. Based on the results of the 1999-2000 surface water study, there is minimal to no threat of Las Flores Creek becoming impacted with target contaminants at levels above cleanup goals because Site 43286 groundwater has been remediated to these concentrations. Similarly, the three production wells (10S/5W18E2, 10S/5W18M3, and 10S/5W18M4) located in the Las Flores watershed, are clustered approximately 4.25 miles to the south of the site and are not likely to be impacted.

The RWQCB has issued supplemental guidance which aids in determining whether a UST site in California qualifies as a "low-risk soils-only" case or a "low-risk groundwater" case. Based on this guidance, because both residual soil and groundwater impacts exist at Site 43286, the site does not qualify as a low-risk soils-only site as defined in the *Interim Guidance on Required Cleanup at Low-Risk Fuel Contaminated Sites* (RWQCB, 1996). However, because the contaminated plume is stable and not migrating, the site was screened to determine if it has the potential to meet the criteria required for low-risk groundwater sites. These criteria are presented below, along with an explanation of how the site currently meets, or does not meet, the criteria.

1. *Groundwater has been impacted, the leak has been stopped, and ongoing sources, including free product, have been removed or remediated to the extent possible.*
 - Two 10,000-gallon gasoline USTs and one 550-gallon waste oil UST were removed from the site in October 1993.
 - Groundwater at the Site 43286 currently is impacted with targeted contaminants, but at levels below cleanup values. In 2005, benzene and toluene were not detected

above reporting limits, and maximum detected concentrations of ethylbenzene, xylenes, and MTBE were 0.50 µg/L, 1.2 µg/L, and 4.5 µg/L, respectively, compared to their corresponding cleanup goals of 680 µg/L, 1,750 µg/L, and 13 µg/L. TPH-D and TPH-G were detected at 0.13 mg/L and 0.088 mg/L, respectively, compared to taste and odor threshold values of 0.10 mg/L and 0.005 mg/L.

- An IAS/SVE system was installed and operated by Battelle at Site 43286 from February 1999 through August 2000. The system was effective at removing 572 lb of petroleum hydrocarbons, which represents a 95.8 to 99.8% reduction in groundwater contamination.

2. *The site has been adequately characterized.*

- In 1994, nine borings (B1-B9) and three groundwater monitoring wells (43286-MW01, 43286-MW02, and 43286-MW03) were installed and sampled. Investigation indicated that soil and groundwater at the site had been impacted by a release of fuel hydrocarbons.
- In August and September 1995, OHM installed and sampled one boring (B10) and one groundwater monitoring well (43286-MW04).
- During March and April 1997, OHM/M&E installed and sampled nine borings (HP-1 through HP-9) and four groundwater monitoring wells (43286-MW01A, 43286-MW05A, 43286-MW05B, and 43286-MW06), hand-augered borings into the Las Flores Creek embankment, and installed temporary stream channel piezometers.
- From September 1995 to July 1997, OHM conducted 7 quarterly groundwater monitoring events. From February 1998 to July 2001 Battelle conducted 16 quarterly groundwater monitoring events, and then conducted semi-annual groundwater monitoring for two years from July 2002 to January 2004. Finally, two concurrent quarterly monitoring events were performed in April and July 2005.
- From 1999 to 2000, surface water and groundwater analyses were performed at Las Flores Creek in order to evaluate the impact of site contaminants to this ecological sensitive area.
- In December 2005, Battelle conducted soil verification sampling at four predetermined locations.

3. *The site is located in a basin without designated municipal/domestic beneficial use.*

- Not applicable (see criterion 4).

4. *The site is located in a basin with municipal/domestic beneficial use (outside a sensitive aquifer boundary).*

- Las Flores Creek is excepted from municipal beneficial use, but is reserved for agricultural, recreational, warm/cold fish habitat, wildlife habitat, and endangered species.

- The three production wells (10S/5W18E2, 10S/5W18M3, and 10S/5W18M4) located in the Las Flores watershed are clustered approximately 4.25 miles to the south of the site.
5. *The dissolved hydrocarbon plume is not migrating.*
- Analytical results from 29 groundwater monitoring events have shown that the contaminant plume is stable and limited to the area beneath the Site 43286. Results from the two 2005 groundwater monitoring events showed no detections of targeted contaminants above cleanup goals.
6. *No water wells, deeper drinking water aquifers, surface water, or sensitive receptors are likely to be impacted.*
- The three production wells (10S/5W18E2, 10S/5W18M3, and 10S/5W18M4) located in the Las Flores watershed are clustered approximately 4.25 miles to the south of the site, and are not threatened by Site 43286.
 - Las Flores Creek is the nearest surface water body and is located adjacent to Site 43286 with the main channel of the creek located approximately 200 ft east of the site. Findings of the 1999-2000 groundwater/surface water study determined that Site 43286 currently poses minimal threats to surface water and groundwater downgradient of the site.
7. *The site presents no significant risk to human health.*
- Two 10,000-gallon gasoline USTs and one 550-gallon waste oil UST were removed from the Site in October 1993.
 - An IAS/SVE system was installed and operated by Battelle at Site 43286 from February 1999 through August 2000. The system was effective at removing 572 lb of petroleum hydrocarbons, which represents a 95.8 to 99.8% reduction in groundwater contamination.
 - Groundwater at the Site 43286 is currently impacted with COCs, but at levels below cleanup values. In 2005, benzene and toluene were not detected above reporting limits, and maximum detected concentrations of ethylbenzene, xylenes, and MTBE were 0.50 µg/L, 1.2 µg/L, and 4.5 µg/L, compared to cleanup goals of 680 µg/L, 1,750 µg/L, and 13 µg/L, respectively. These cleanup goals represent MCLs for drinking water, and Site 43286 groundwater achieved these goals.
8. *The site presents no significant risk to the environment.*
- Current cleanup goals are based on concentrations protective of human health, however, by meeting these criteria the site is also protective of the environment. In addition, findings of the Las Flores Creek study conducted from 1999-2000 determined there is minimal to no threat of Las Flores Creek becoming impacted with target contaminants at levels above cleanup goals because Site 43286 groundwater has been remediated to these concentrations.

Section 5.0: SUMMARY

This Closure Report documents the mitigation process conducted by the discharger at Site 43286, better known as the 43 Area MWR Gas Station, including initial assessments, site monitoring, corrective action, and verification activities.

Verification soil and groundwater sampling have been conducted as part of the post-corrective action activities. Verification soil samples collected at Site 43286 indicated that detectable concentrations of target contaminants were only present in borings 43286-SV1 and 43286-SV4 but at concentrations below the established soil cleanup goals. Verification groundwater sampling was initiated immediately after the IAS/SVE system was shutdown on August 4, 2000 to evaluate the potential for contaminant rebound. No contaminant rebound has been reported from any site wells during ten subsequent groundwater monitoring events.

Las Flores Creek, which is located adjacent to Site 43286, is designated as a sensitive ecological receptor. A 1999-2000 creek study determined that there is minimal to no threat of Las Flores Creek becoming impacted with target contaminants originating from Site 43286 at levels above cleanup goals because site groundwater has been remediated to acceptable concentrations.

Extensive environmental activities have been conducted for more than a decade to support the remediation efforts at Site 43286. Though residual contamination remains at Site 43286, both soil and groundwater samples have conclusively shown that concentrations are below the cleanup criteria established for the site. In addition, an evaluation of Site 43286 shows that the current conditions meet the criteria established for “low-risk groundwater” sites. Based on this conclusive evidence, a recommendation for site closure with no further action is requested.

Section 6.0: REFERENCES

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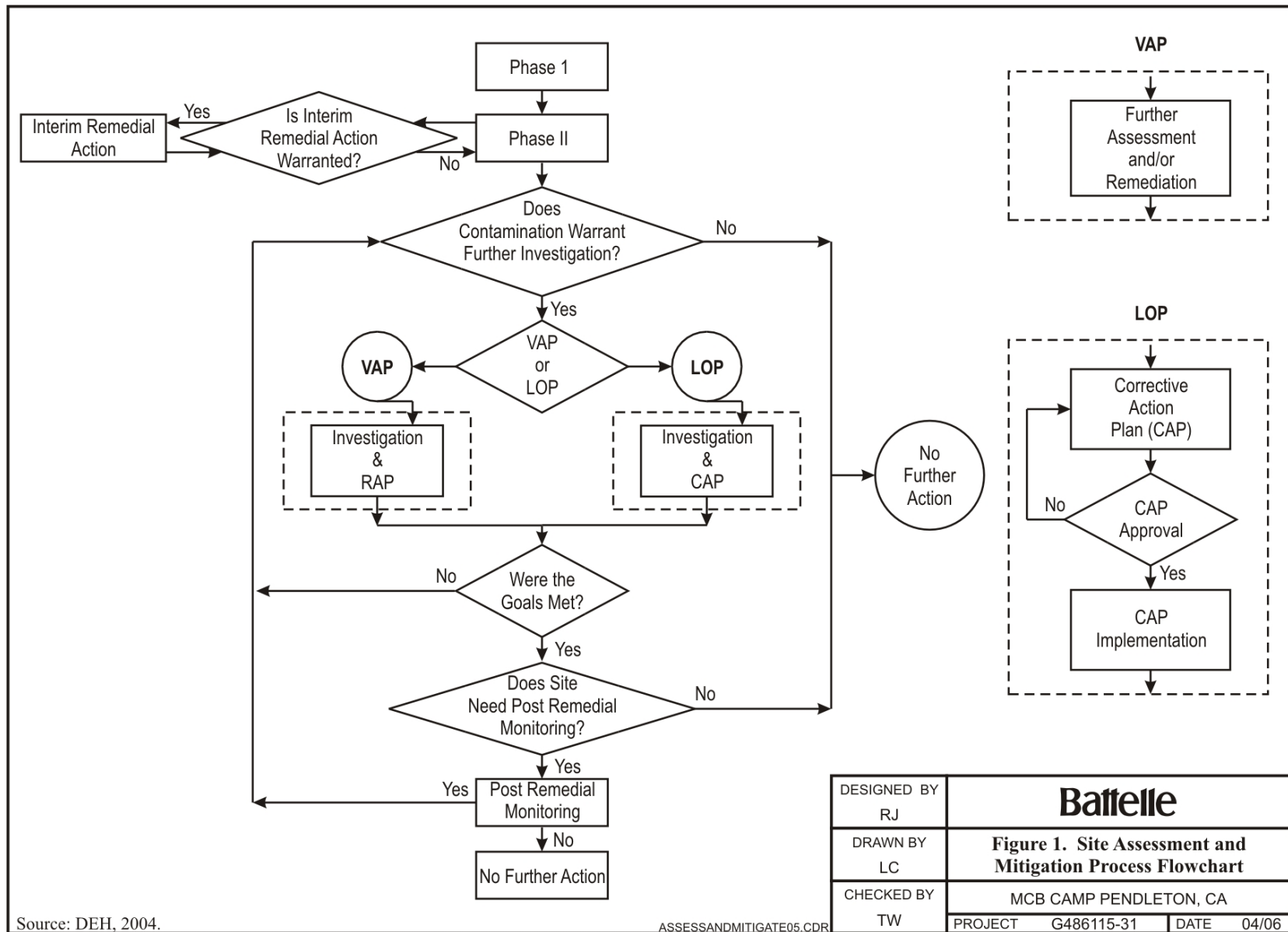
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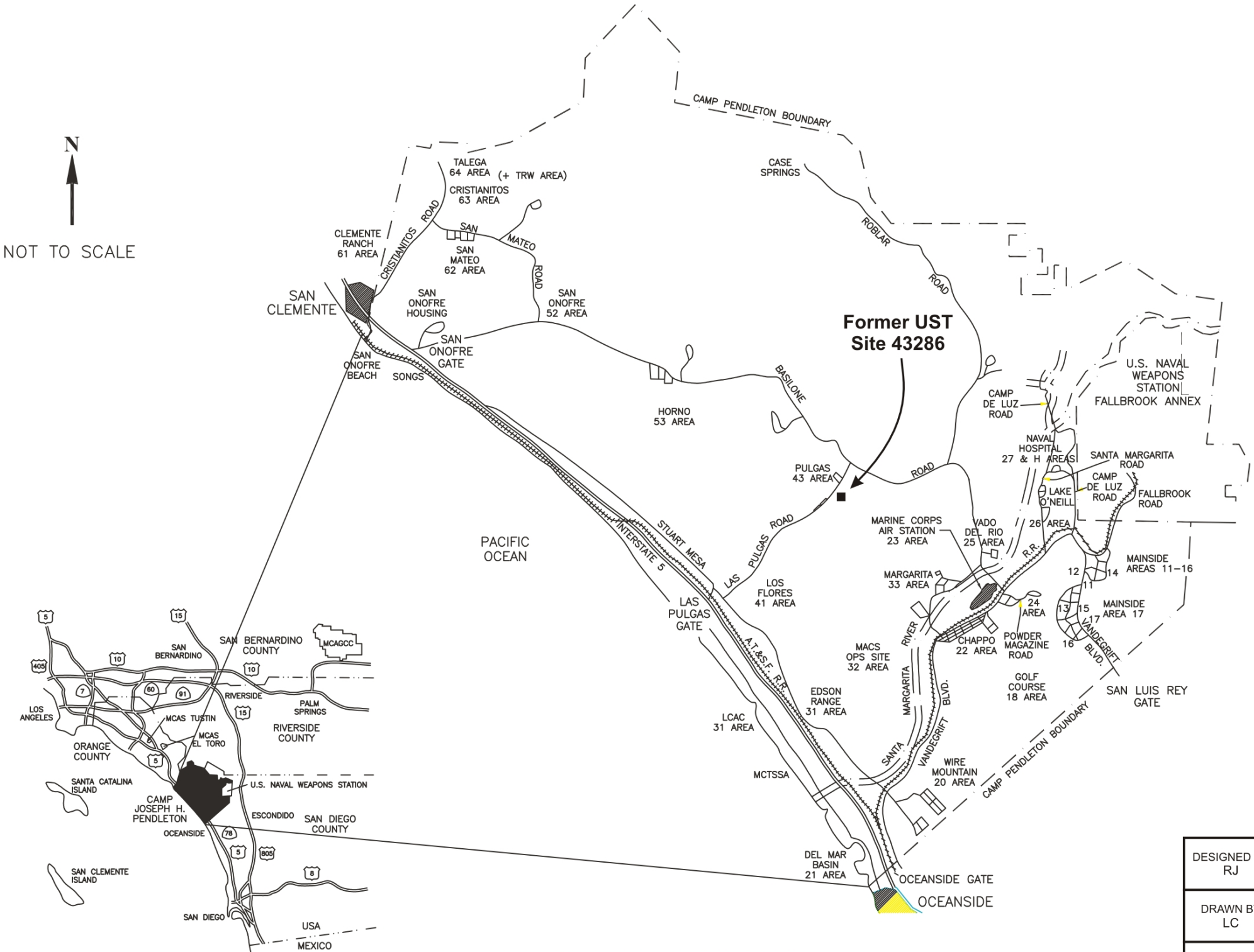
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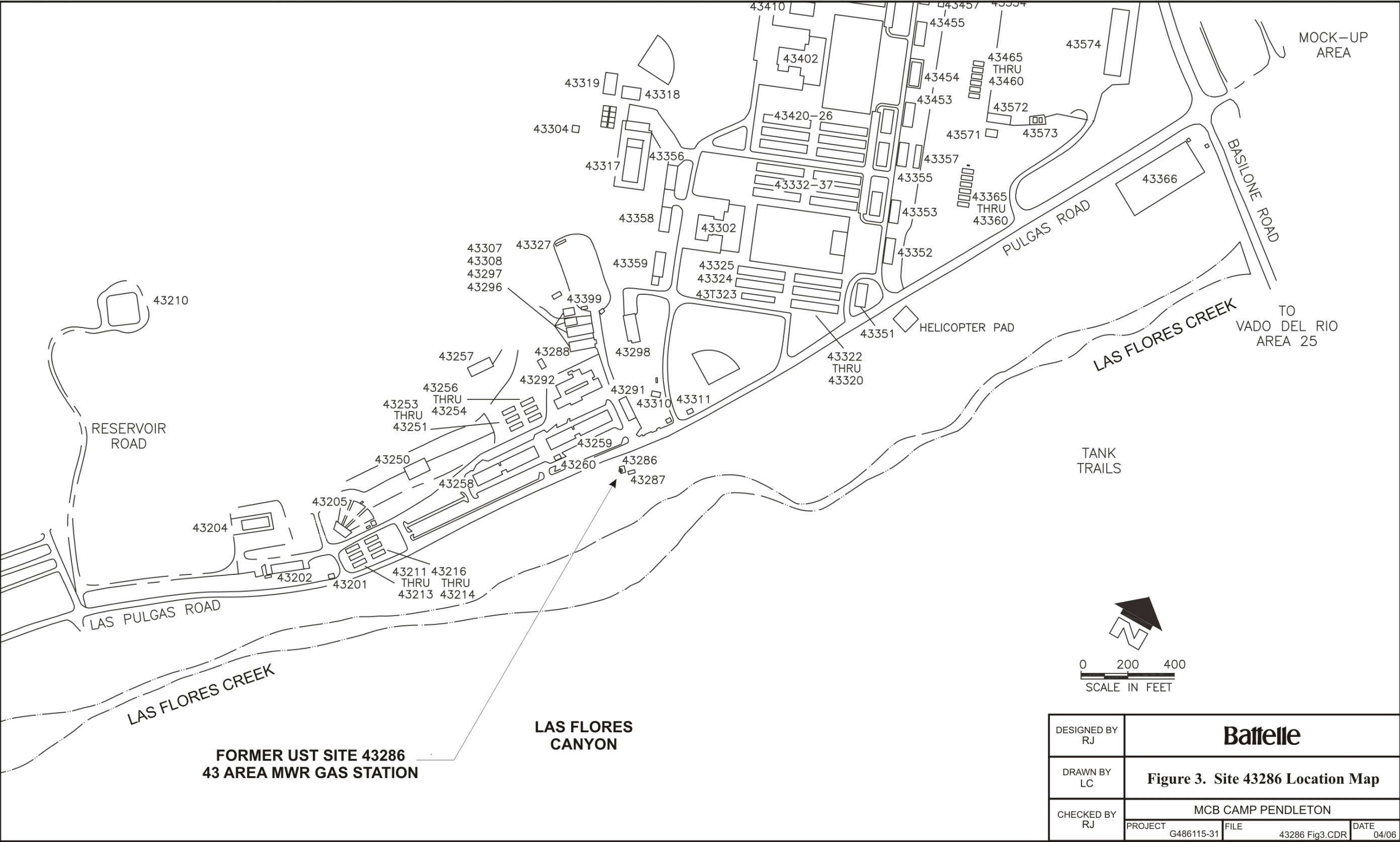
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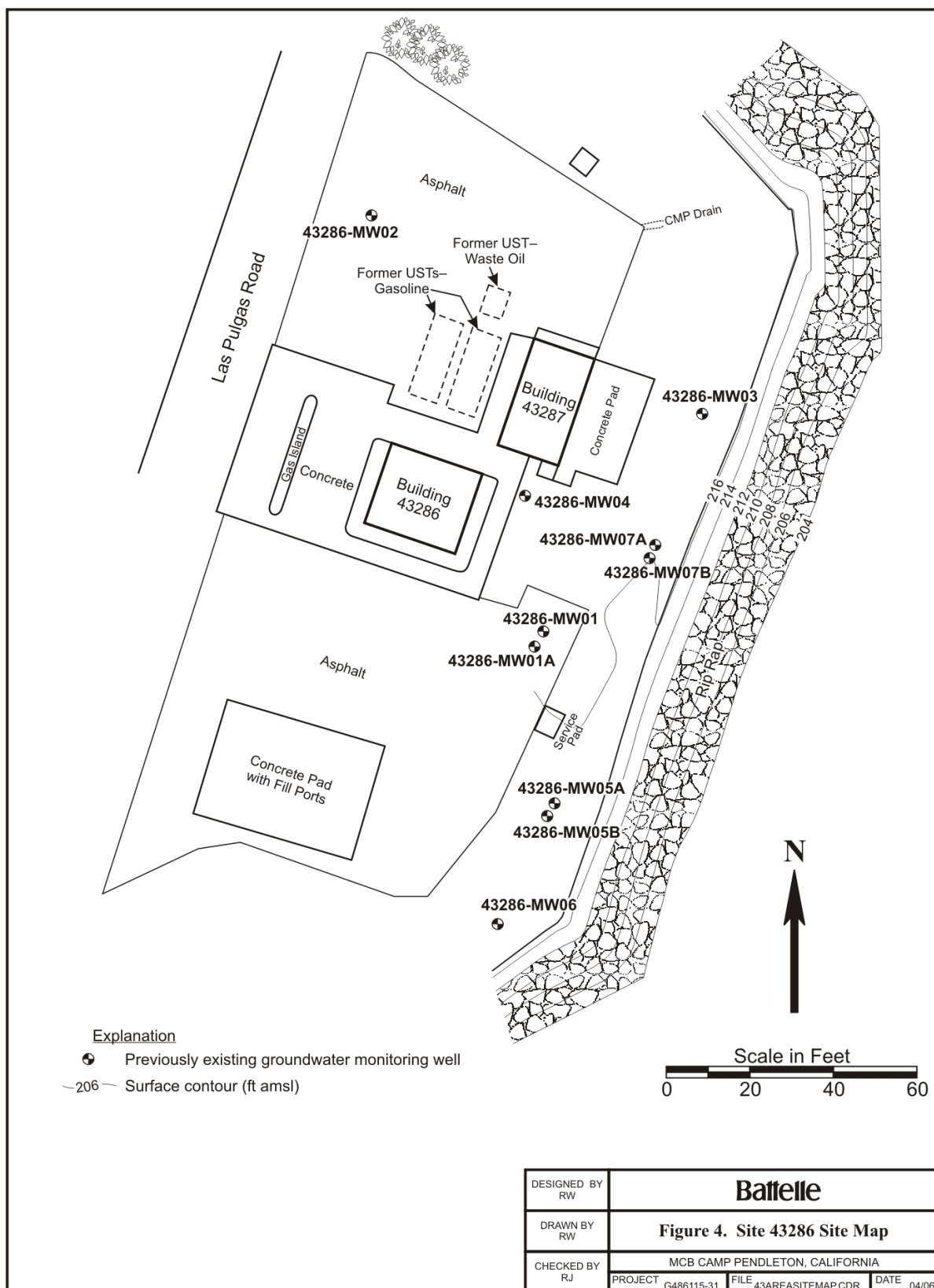
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NOTE: MODIFIED FROM KLEINFELDER, REMOVAL OF UNDERGROUND STORAGE
TANKS, CAMP JOSEPH H. PENDLETON, CAMP PENDLETON, CALIFORNIA
NAVFAC DWG. NO. 8029558 AND 8029553

DESIGNED BY RJ	Battelle		
DRAWN BY LC	Figure 2. Site 43286 Vicinity Map		
CHECKED BY RJ	MCB CAMP PENDLETON, CALIFORNIA		
	PROJECT G486115-31	FILE 43286FIGURE2.CDR	DATE 04/06





43286-MW04/MW04D				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050/<0.050	<0.050/<0.050	0.10/0.068	<0.050
TPH-MO (mg/L)	<0.50/<0.50	<0.50/<0.50	<0.50/<0.50	<0.50
TPH-G (mg/L)	<0.050/<0.050	<0.050/<0.050	<0.050/<0.050	<0.050
Benzene (µg/L)	<0.50/<0.50	<0.50/<0.50	<0.50/<0.50	<0.50
Toluene (µg/L)	<0.50/<0.50	<0.50/<0.50	<0.50/<0.50	<0.50
Ethylbenzene (µg/L)	<0.50/<0.50	<0.50/<0.50	<0.50/<0.50	<0.50
Total Xylenes (µg/L)	<1.00/<1.00	<1.00/<1.00	<1.00/<1.00	<1.00
MTBE (µg/L)	<0.50/<0.50	<0.50/<0.50	<0.50/<0.50	<0.50

43286-MW07B/MW07BD				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50/<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50/<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50/<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00/<1.00
MTBE (µg/L)	5.9	9.1	4.5	2.4/2.4

43286-MW01A				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	NS	<0.050	<0.050
TPH-MO (mg/L)	<0.50	NS	<0.50	<0.50
TPH-G (mg/L)	<0.10	NS	<0.050	<0.050
Benzene (µg/L)	<0.50	NS	<0.50	<0.50
Toluene (µg/L)	<0.50	NS	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	NS	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	NS	<1.00	<1.00
MTBE (µg/L)	1.3	NS	<0.50	<0.50

43286-MW05A				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	NS	NS	0.13	NS
TPH-MO (mg/L)	NS	NS	<0.50	NS
TPH-G (mg/L)	NS	NS	0.088	NS
Benzene (µg/L)	NS	NS	<0.50	NS
Toluene (µg/L)	NS	NS	<0.50	NS
Ethylbenzene (µg/L)	NS	NS	0.5	NS
Total Xylenes (µg/L)	NS	NS	1.2	NS
MTBE (µg/L)	NS	NS	3	NS

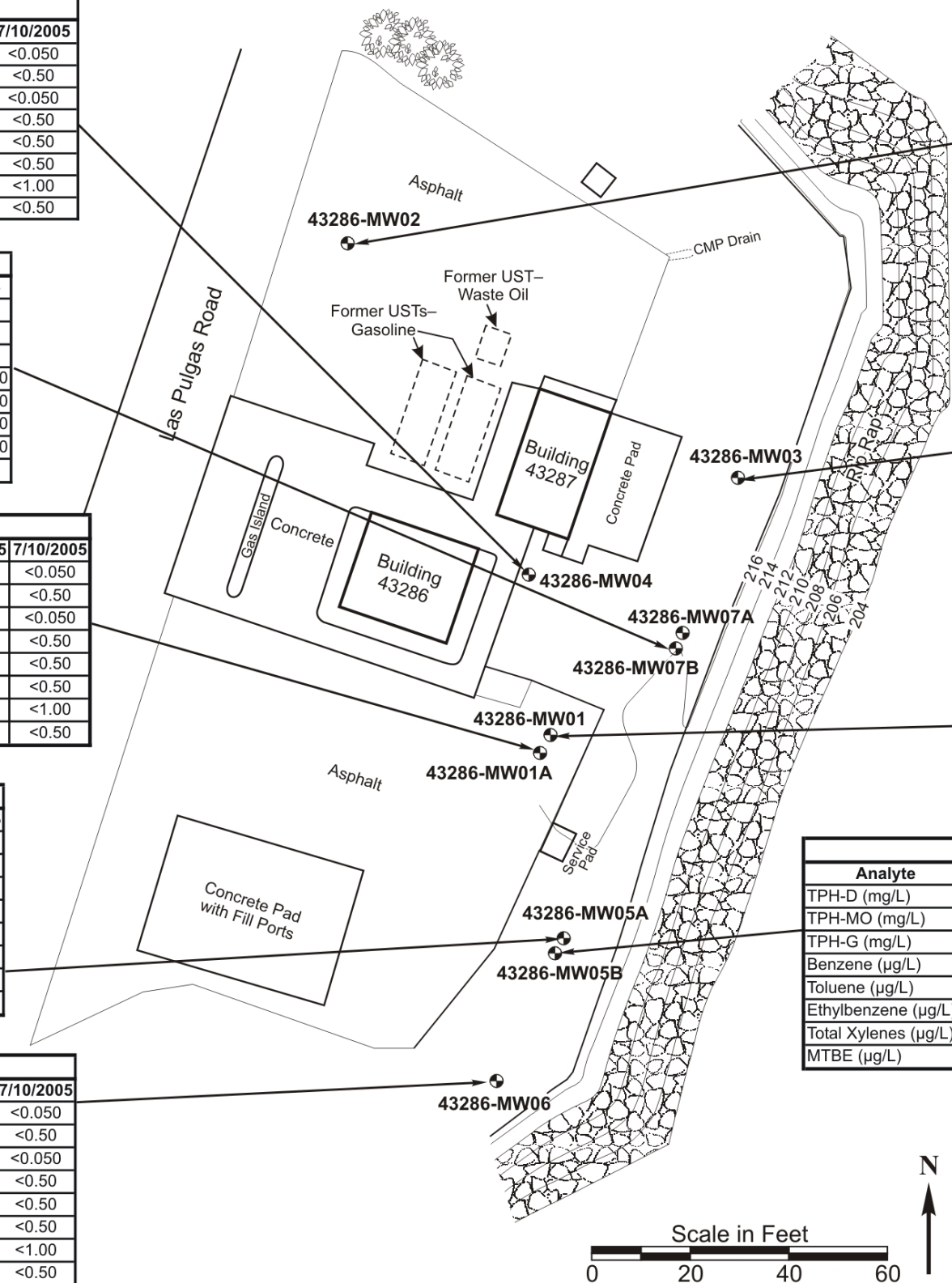
43286-MW06				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00
MTBE (µg/L)	<0.50	<0.50	<0.50	<0.50

43286-MW02				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00
MTBE (µg/L)	<0.50	<0.50	<0.50	<0.50

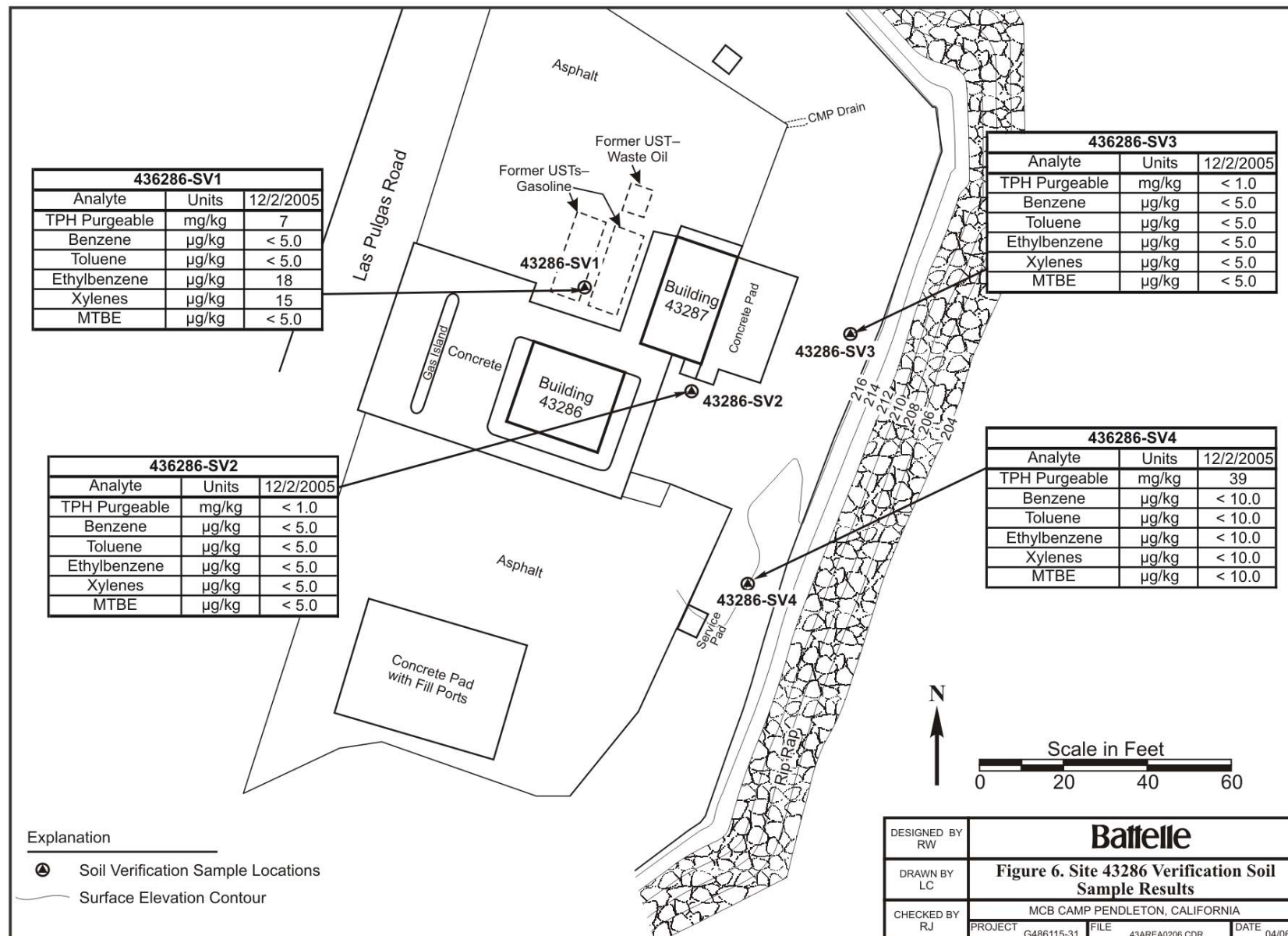
43286-MW03				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00
MTBE (µg/L)	1.6	1.1	0.71	<0.50

43286-MW01				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00
MTBE (µg/L)	<0.50	<0.50	<0.50	<0.50

43286-MW05B				
Analyte	7/21/2003	1/18/2004	4/20/2005	7/10/2005
TPH-D (mg/L)	<0.050	<0.050	<0.050	<0.050
TPH-MO (mg/L)	<0.50	<0.50	<0.50	<0.50
TPH-G (mg/L)	<0.050	<0.050	<0.050	<0.050
Benzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Toluene (µg/L)	<0.50	<0.50	<0.50	<0.50
Ethylbenzene (µg/L)	<0.50	<0.50	<0.50	<0.50
Total Xylenes (µg/L)	<1.00	<1.00	<1.00	<1.00
MTBE (µg/L)	<0.50	<0.50	<0.50	<0.50



DESIGNED BY RW	Battelle		
DRAWN BY LC	Figure 5. Site 43286 Quarterly Groundwater Sample Results		
CHECKED BY RJ	MCB CAMP PENDLETON, CALIFORNIA		
	PROJECT G486115-31	FILE 43286FIGURE5.CDR	DATE 04/06



TABLES

Table 1. Summary of Site 43286 Environmental Activities

Date	Activity	Reference
October 1993	Removed two 10,000-gallon USTs and one 500-gallon UST.	Not available
1994	Initial Site Assessment - Nine borings (B1-B9) and three groundwater Monitoring wells (43286-MW01, 43286-MW02, and 43286-MW03) were installed and sampled. Investigation indicated that soil and groundwater at the site had been impacted by a release of fuel hydrocarbons.	IT Corp., 1994
August-September 1995	Additional Site Assessment - OHM installed and sampled one boring (B10) and one groundwater monitoring well (43286-MW04).	OHM, 1995
September-October 1995	Pilot Testing - OHM conducted aquifer pump testing, SVE, and DVE pilot-scale testing.	OHM, 1996
September 1995 - July 1997	Groundwater Monitoring - OHM conducted 7 consecutive quarterly groundwater monitoring events.	OHM, 1997
March-April 1997	Additional Site Assessment - OHM and M&E installed and sampled nine borings (HP-1 through HP-9) and four groundwater monitoring wells (43286-MW01A, 43286-MW05A, 43286-MW05B, and 43286-MW06), hand-augered borings into the Las Flores Creek embankment, and installed temporary stream channel piezometers in the Las Flores Creek.	OHM/M&E, 1997
February 1998 - July 2001	Groundwater Monitoring - Battelle conducted 16 consecutive quarterly groundwater monitoring events.	Battelle, 1999, 2000a, 2001a, 2001b, 2001c
May 1998	Final Corrective Action Plan (CAP) - The CAP recommended IAS/SVE for site remediation	OHM/M&E, 1998
July 1998	Final Remediation Work Plan - Battelle provided design, installation, and operation procedures for the IAS/SVE system.	Battelle, 1998a
December 1998 - January 1999	Field Design Testing - Battelle installed and conducted pilot testing for IAS/SVE feasibility and installed two additional groundwater monitoring wells (43286-MW07A and 43286-MW07B).	Not applicable
February 1999 – August 2000	IAS/SVE System Operation - Battelle implemented full-scale IAS/SVE system operation.	Not applicable
May 1999 – February 2000	Las Flores Creek surface water sampling - Surface water and groundwater sampling from installed piezometers and analysis was performed from the Las Flores Creek in order to evaluate the impact of site contaminants in this ecologically significant area.	Battelle, 2000b
August 2000	IAS/SVE System Shutdown - Battelle shut down the IAS/SVE system and initiated quarterly groundwater monitoring for one year to evaluate contaminant rebound.	Not Applicable
October 2001	Remedial Recommendation Report - Battelle documented groundwater monitoring and recommended that the IAS/SVE system be removed.	Battelle, 2001c
June 2002	IAS/SVE System Removal - RWQCB agreed to the removal of the IAS/SVE system and requested that groundwater monitoring be conducted semiannually for two years.	RWQCB, 2002
October 2002	Groundwater Monitoring - Battelle documented an annual monitoring event conducted in June 2002.	Battelle, 2002
October 2002	IAS/SVE Removal - Battelle removed the IAS/SVE system and abandoned IAS/SVE system wells.	Not applicable

Table 1. Summary of Site 43286 Environmental Activities (continued)

Date	Activity	Reference
October 2002	IAS/SVE Removal - Battelle removed the IAS/SVE system and abandoned IAS/SVE system wells.	Not applicable
July 2002 – January 2004	Groundwater Monitoring - Battelle conducted semiannual groundwater monitoring as recommended by the RWQCB.	Battelle, 2002, 2003a, 2004
October 2003	Soil Verification Sampling - Battelle issued the Work Plan for soil verification sampling.	Battelle, 2003b
March 2004	Site Closure Request - Battelle submitted a request for site closure and documented groundwater monitoring results.	Battelle, 2004
April 2004	Work Plan for Soil Verification Sampling - RWQCB questioned locations of proposed verification soil samples.	RWQCB, 2004
January 2005	Site Closure Request - In response to the request for site closure, RWQCB requested that groundwater monitoring be continued for two additional quarters in order to capture high groundwater levels resulting from heavy winter precipitation.	RWQCB, 2005a
April and July 2005	Groundwater Monitoring - Battelle conducted two additional quarters of groundwater monitoring to capture the high groundwater table.	Battelle, 2005
August 2005	Soil Verification Sampling - Battelle received approval to conduct verification soil sampling.	RWQCB, 2005b.
December 2005	Soil Verification Sampling - Battelle conducted soil verification sampling.	Not Applicable

Table 2. Site 43286 Soil and Groundwater Cleanup Goals

Constituent	Soil	Groundwater^(a)
Benzene	ND SPLP or 0.1 mg/kg ^(b) total	1 µg/L
Toluene	ND SPLP or 15 mg/kg total	150 µg/L
Ethylbenzene	ND SPLP or 30 mg/kg total	300 µg/L
Total xylenes	ND SPLP or 175 mg/kg total	1,750 µg/L
MTBE	ND SPLP or 1.3 mg/kg total	13 µg/L

(a) Groundwater cleanup goals correspond to 2003 drinking water MCLs (California Code of Regulations, 2003).

(b) Assumes soil attenuation factor of 100.

µg/L = micrograms per liter.

APPENDIX A

DOCUMENTATION OF IAS/SVE SYSTEM REMOVAL



PERMIT # W100816
A.P.N. #101-000-00
EST # H05939-095

**COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION**

MONITORING WELL AND BORING CONSTRUCTION AND DESTRUCTION PERMIT

SITE NAME: SITE 43286

SITE ADDRESS: MARINE CORPS BASE, CAMP PENDLETON, CA 92055

PERMIT TO: DESTROY 18 AIR SPARGE WELLS, 5 SOIL VAPOR WELLS, 11 SOIL-GAS
MONITORING POINTS AND 9 PIEZOMETERS

PERMIT APPROVAL DATE: OCTOBER 11, 2002

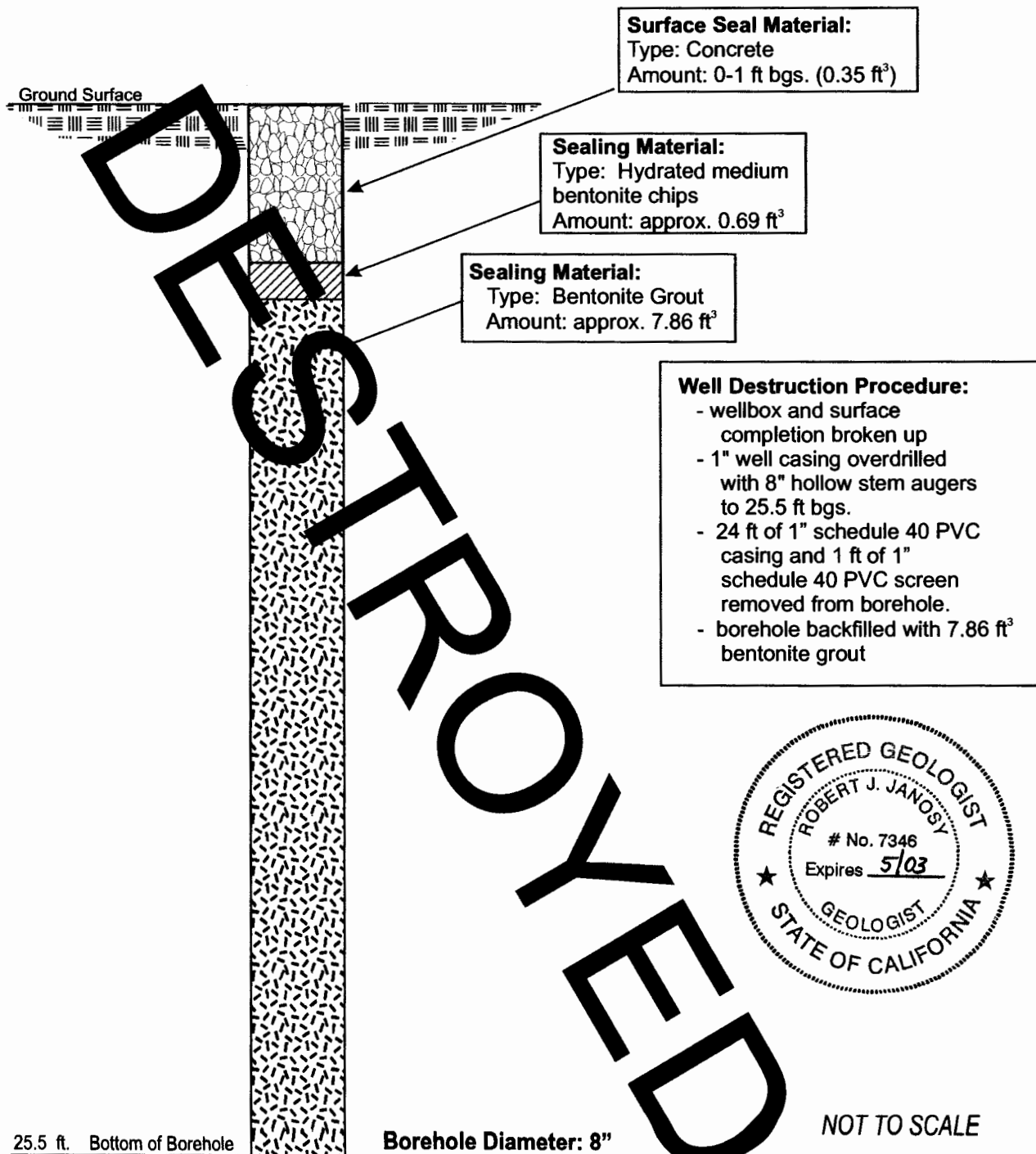
PERMIT EXPIRES ON: FEBRUARY 8, 2003

PERMIT CONDITIONS:

1. The 9 piezometers installed in February 1999 were not installed in compliance with the State Well Standards. None of these wells have any annular seals or proper surface completions. In consideration of the access limitations, these wells will have to be destroyed using the following procedures:
 - The well casings must be excavated to a depth of 3 feet below the ground surface with a minimum of 6 inches around the casing depths.
 - The well casings shall be cut to a depth of 1.5 feet below the ground surface.
 - The interior of the well casings shall be filled to within 5 feet below the ground surface with a high-solids bentonite grout and allowed to set in accordance with the manufacturer's specifications.
 - The interior of the well casings and the excavations around the casings from 5 feet to 1 foot of the ground surface shall be filled with a neat cement meeting the requirements of DWR Bulletin 74-90, Section 9, D, 2,a.
 - The excavation, from 1 foot to the ground surface, can be backfilled with native soil.
2. All material within the original boreholes of the remaining wells, which includes the casings, filterpack and annular seals must be removed. The boreholes must be completely filled with an approved sealing material as specified in Department of Water Resources Bulletin 74-90.
3. All wash water must be contained and disposed of properly.

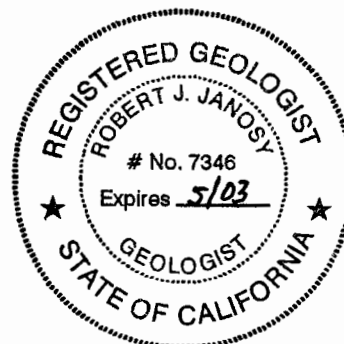
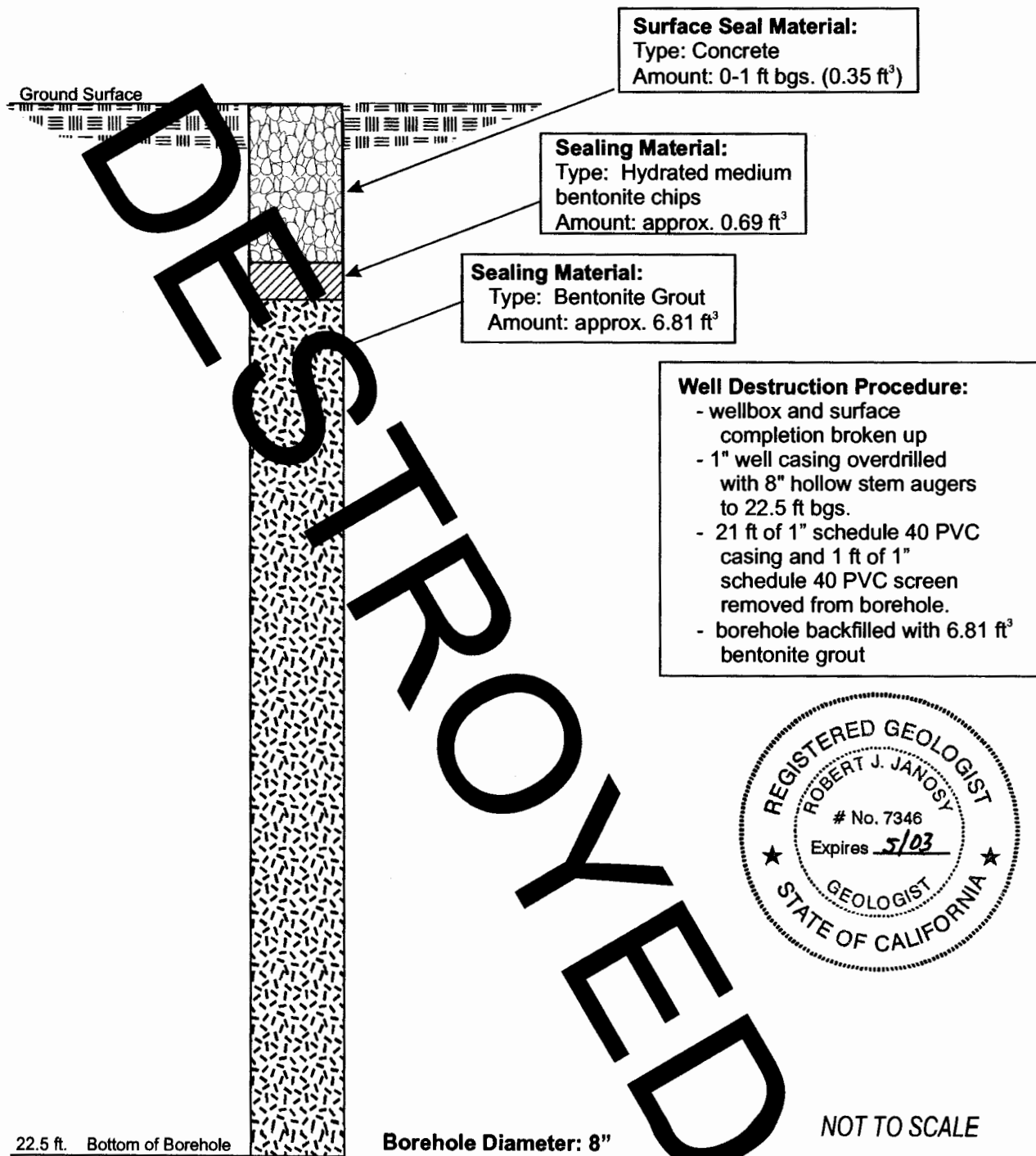
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW1**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069880.825
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/23/02	Easting: 6207381.162
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.87 ft



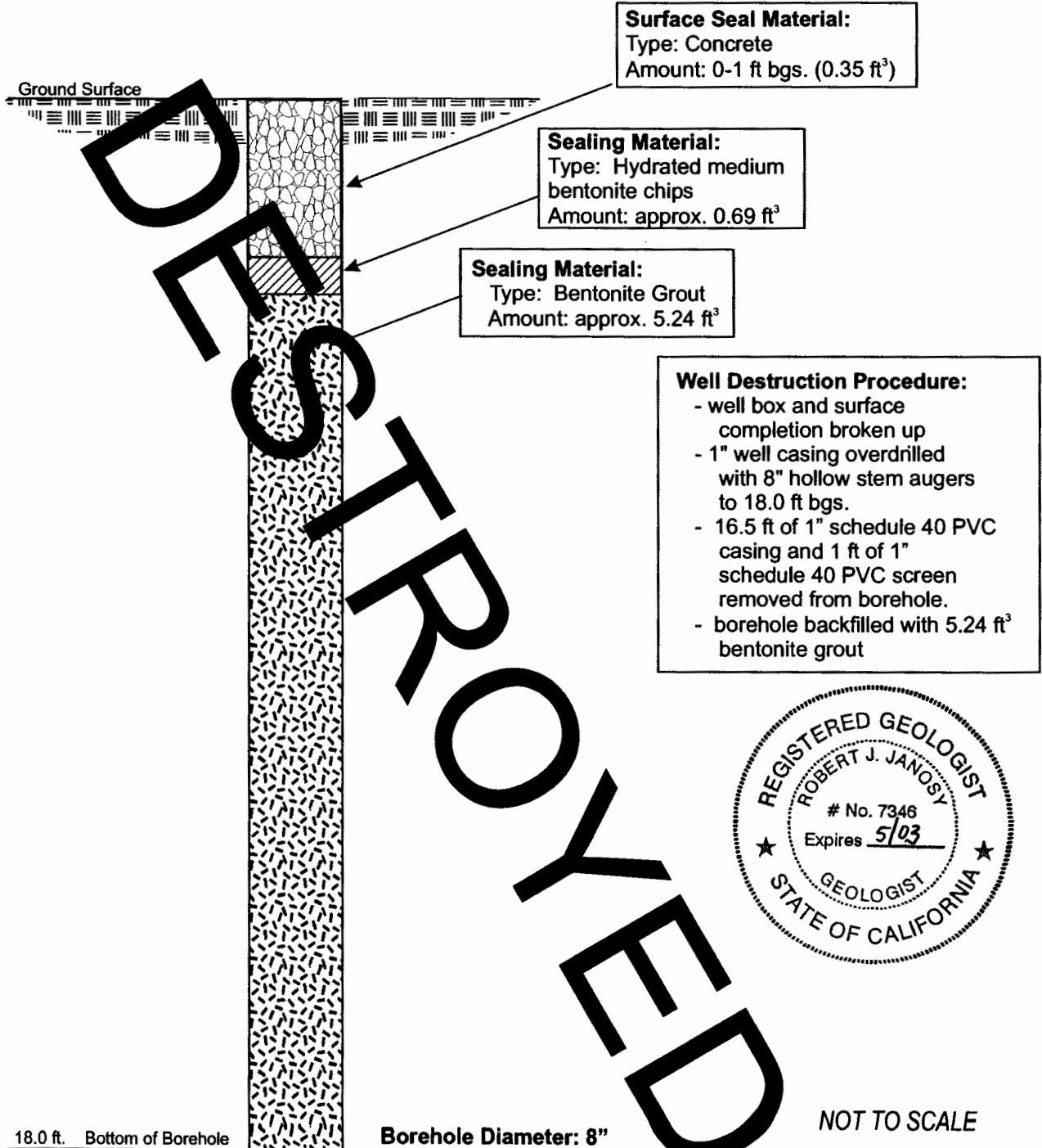
MCB CAMP PENDLETON SPARGE WELL DESTRUCTION DIAGRAM 43286-SW2

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069957.277
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/22/02	Easting: 6207406.387
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.34 ft



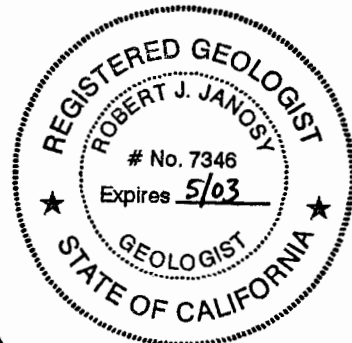
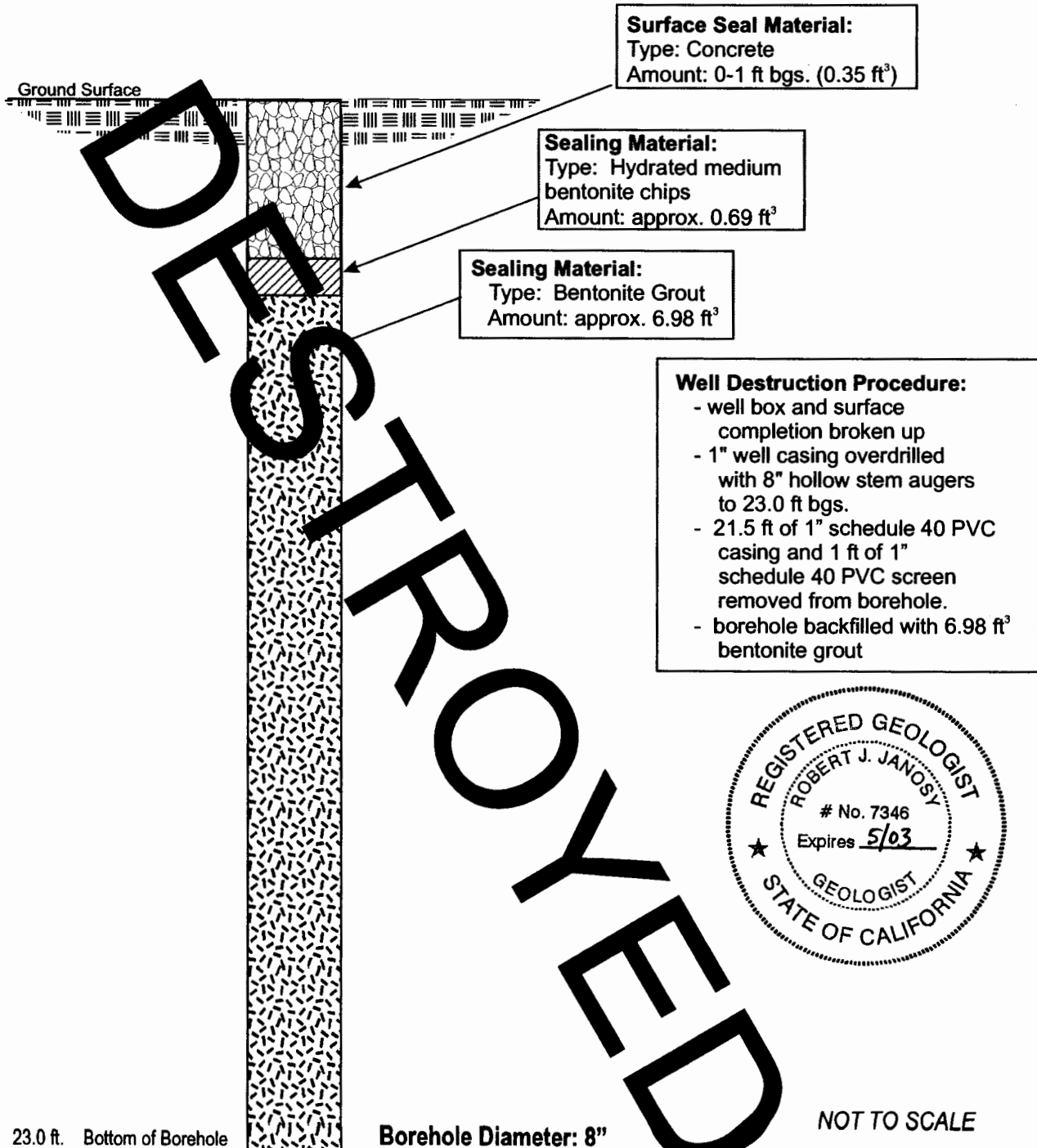
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW3**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2070000.210
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/22/02	Easting: 6207394.706
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.65 ft



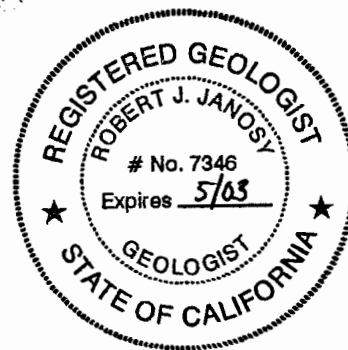
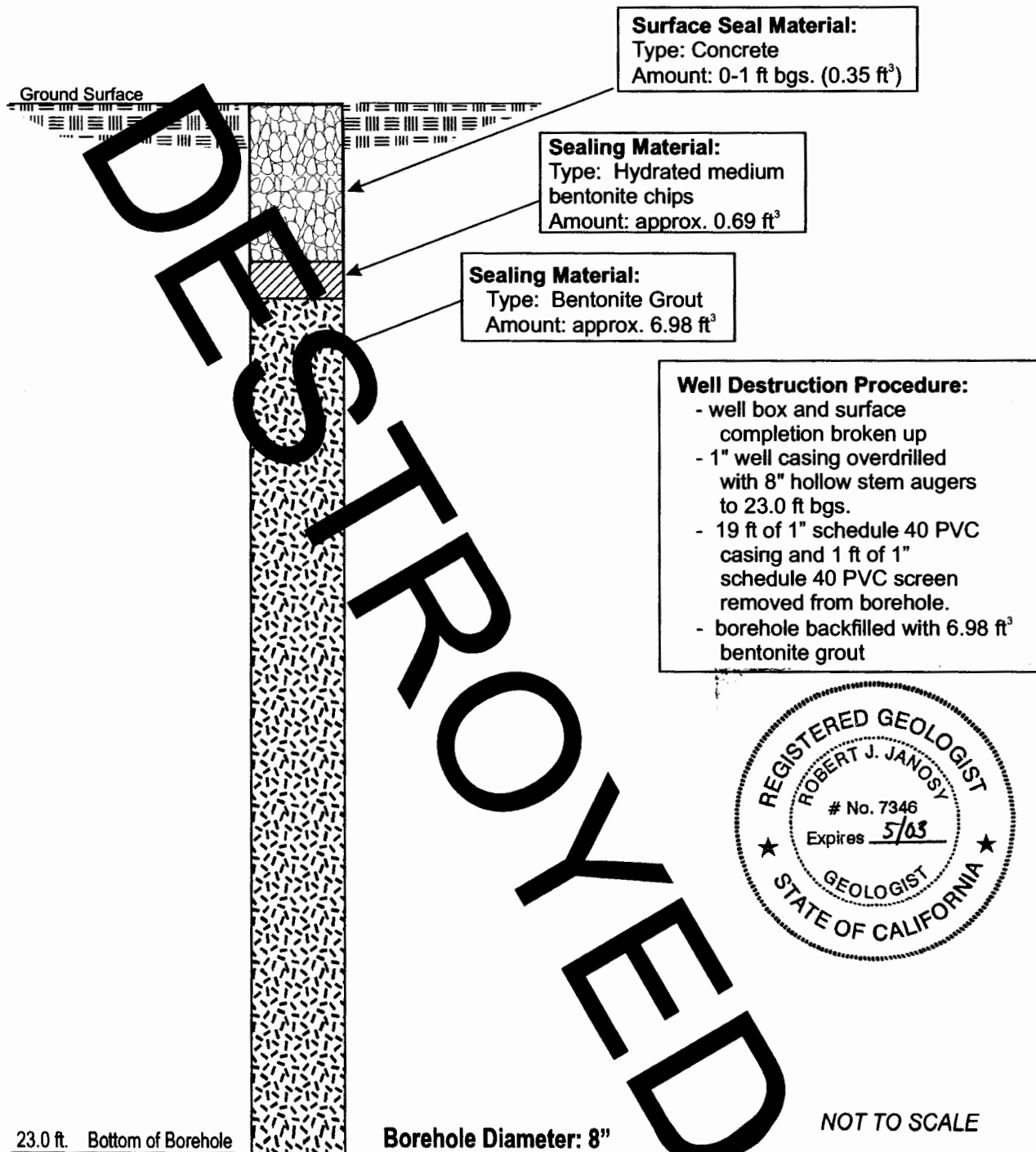
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW4**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069883.427
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/23/02	Easting: 6207380.105
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.83 ft



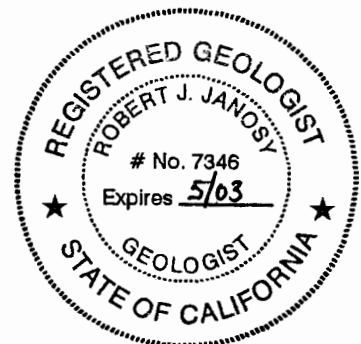
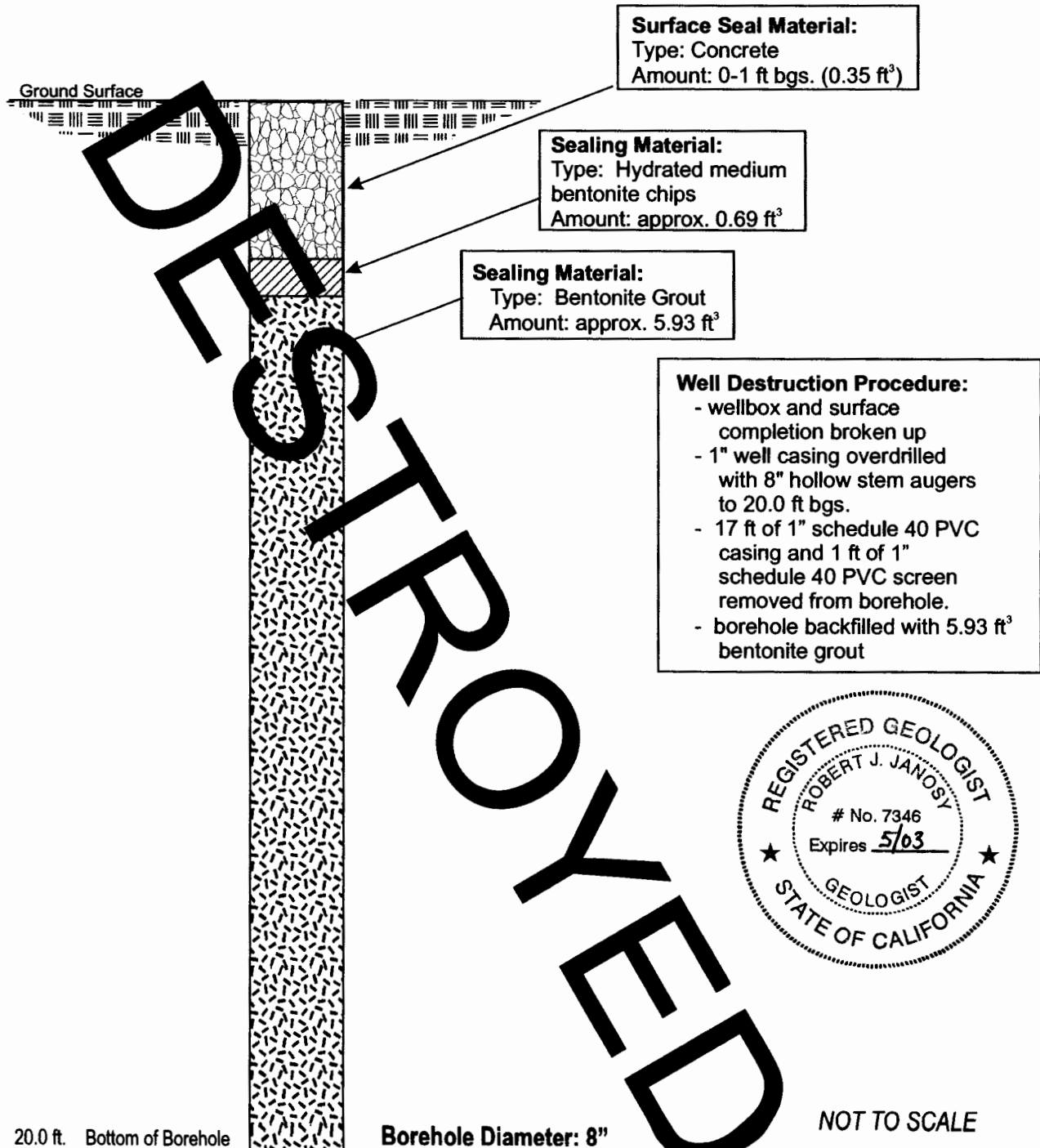
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW5**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069869.414
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/15/99 Date Destroyed: 10/25/02	Easting: 6207377.388
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.49 ft



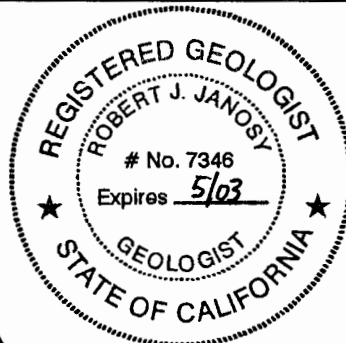
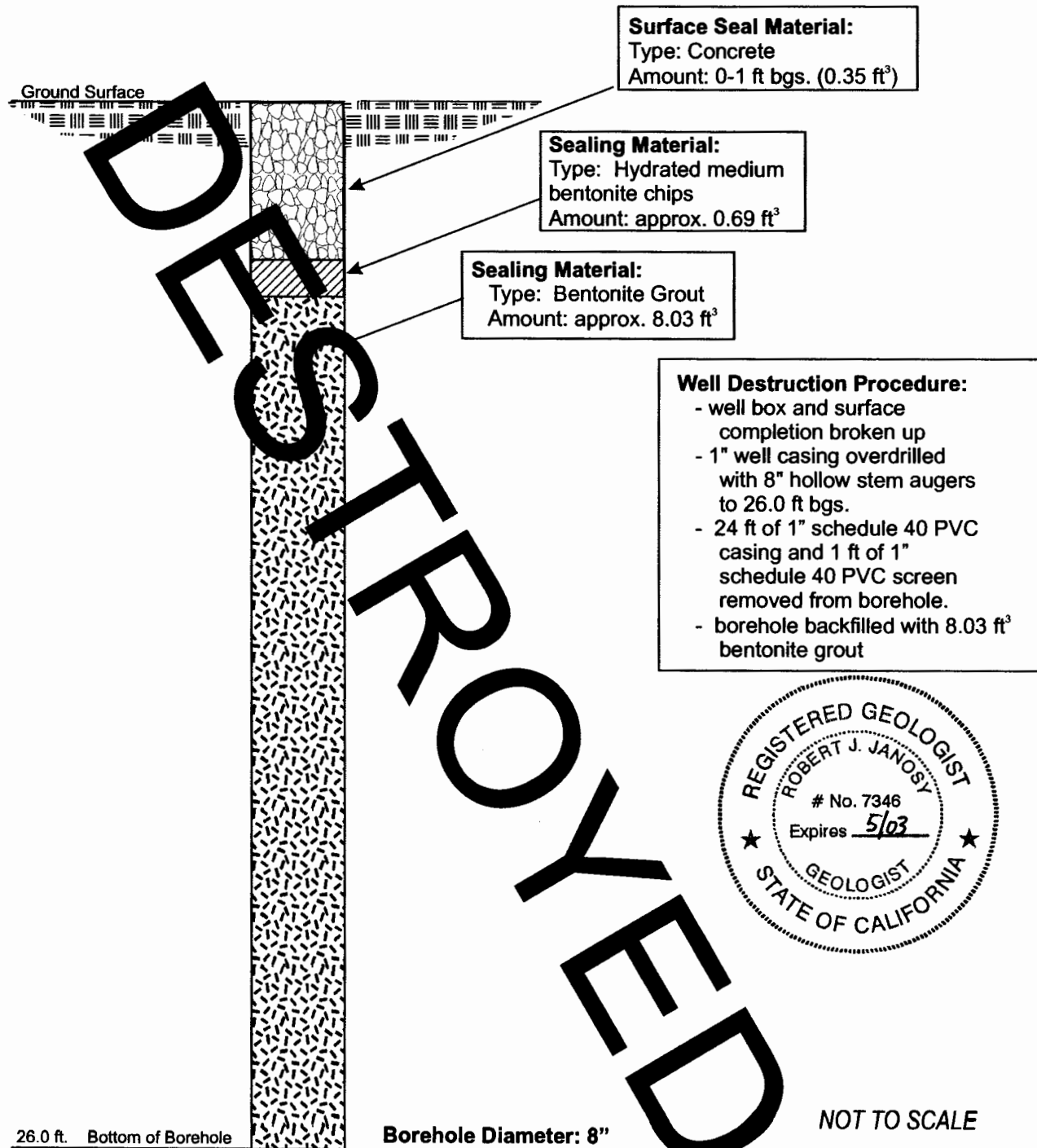
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW6**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069883.722
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/15/99 Date Destroyed: 10/25/02	Easting: 6207377.388
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.84 ft



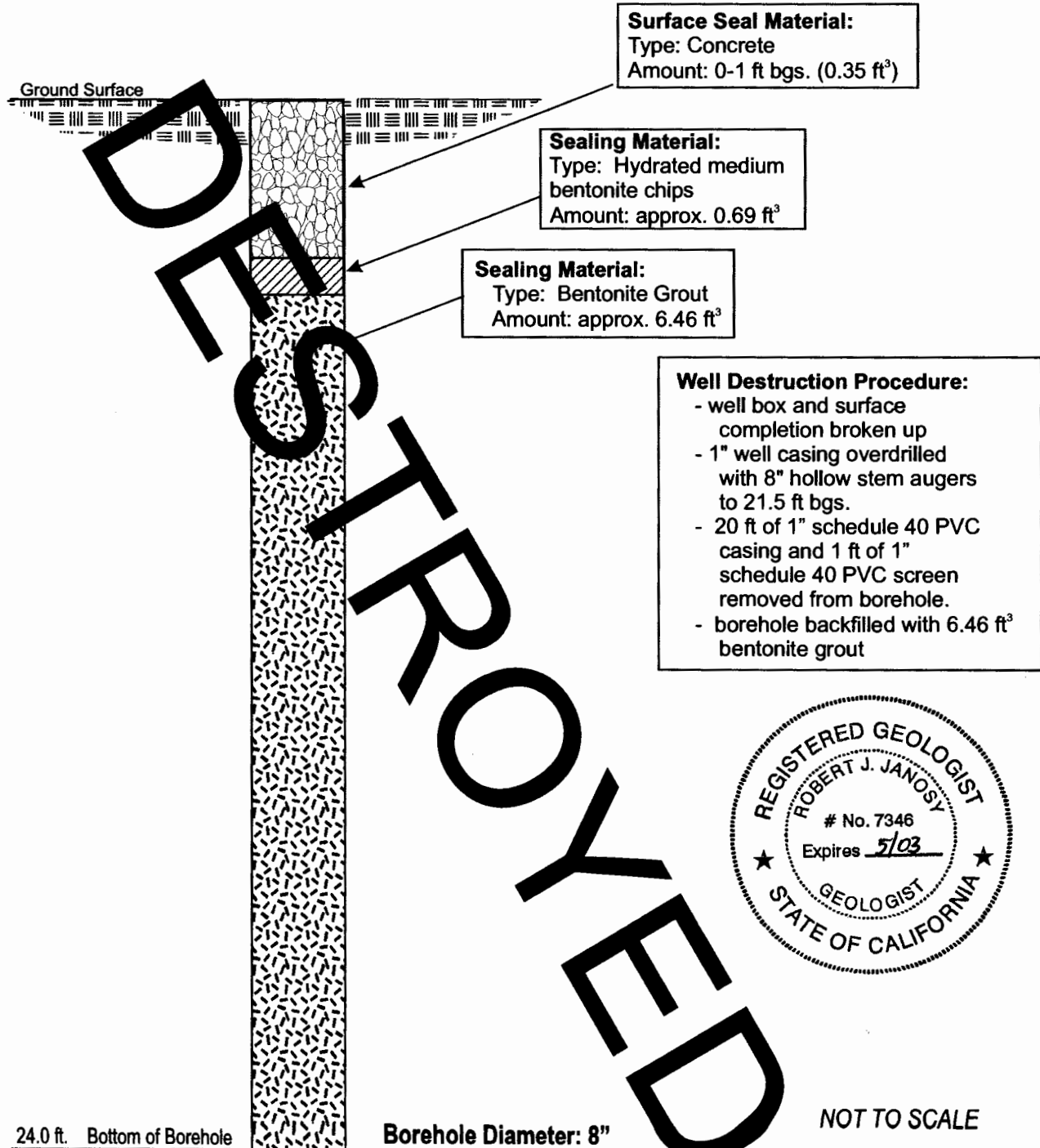
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW7**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069885.8785
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/15/99 Date Destroyed: 10/25/02	Easting: 6207398.1567
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.99 ft



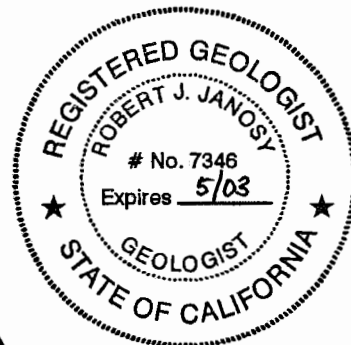
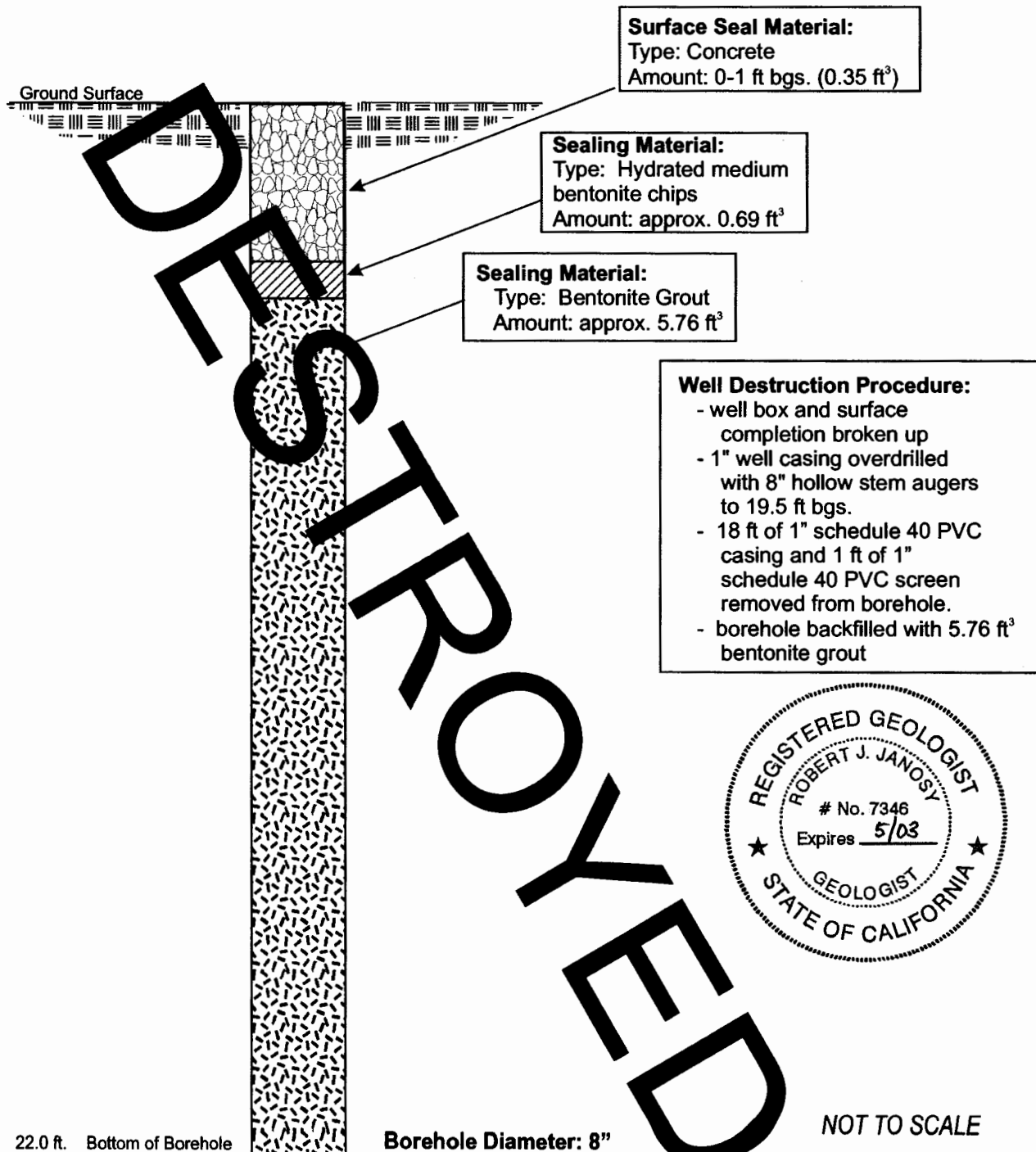
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW8**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069904.4244
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/15/99 Date Destroyed: 10/23/02	Easting: 6207396.6904
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.49 ft



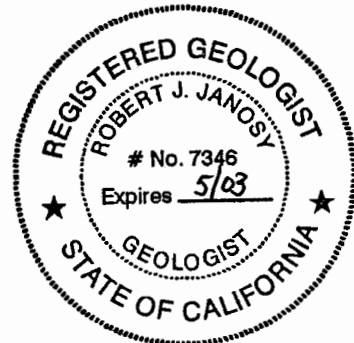
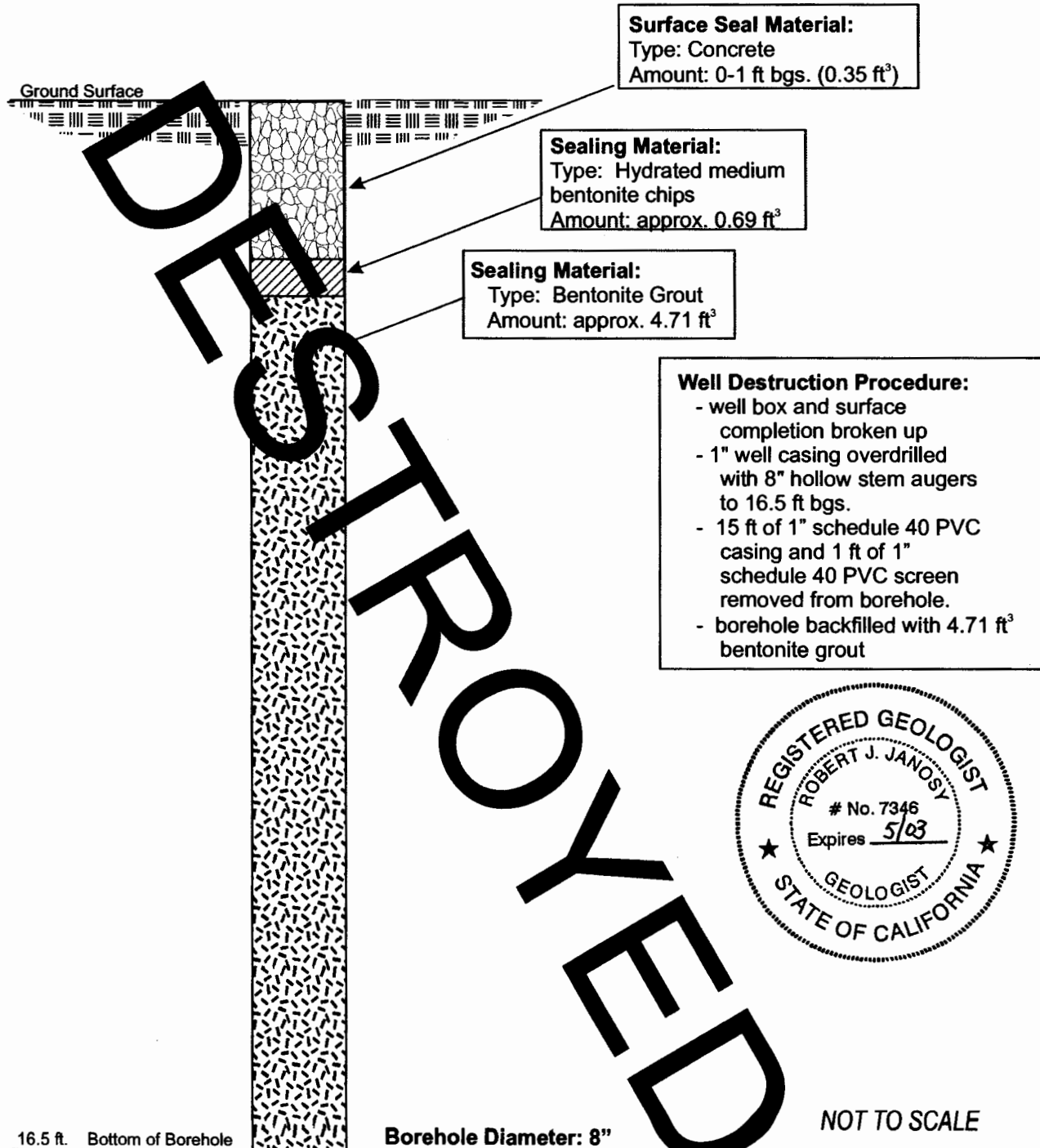
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW9**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069904.5640
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/15/99 Date Destroyed: 10/23/02	Easting: 6207411.6774
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.10 ft



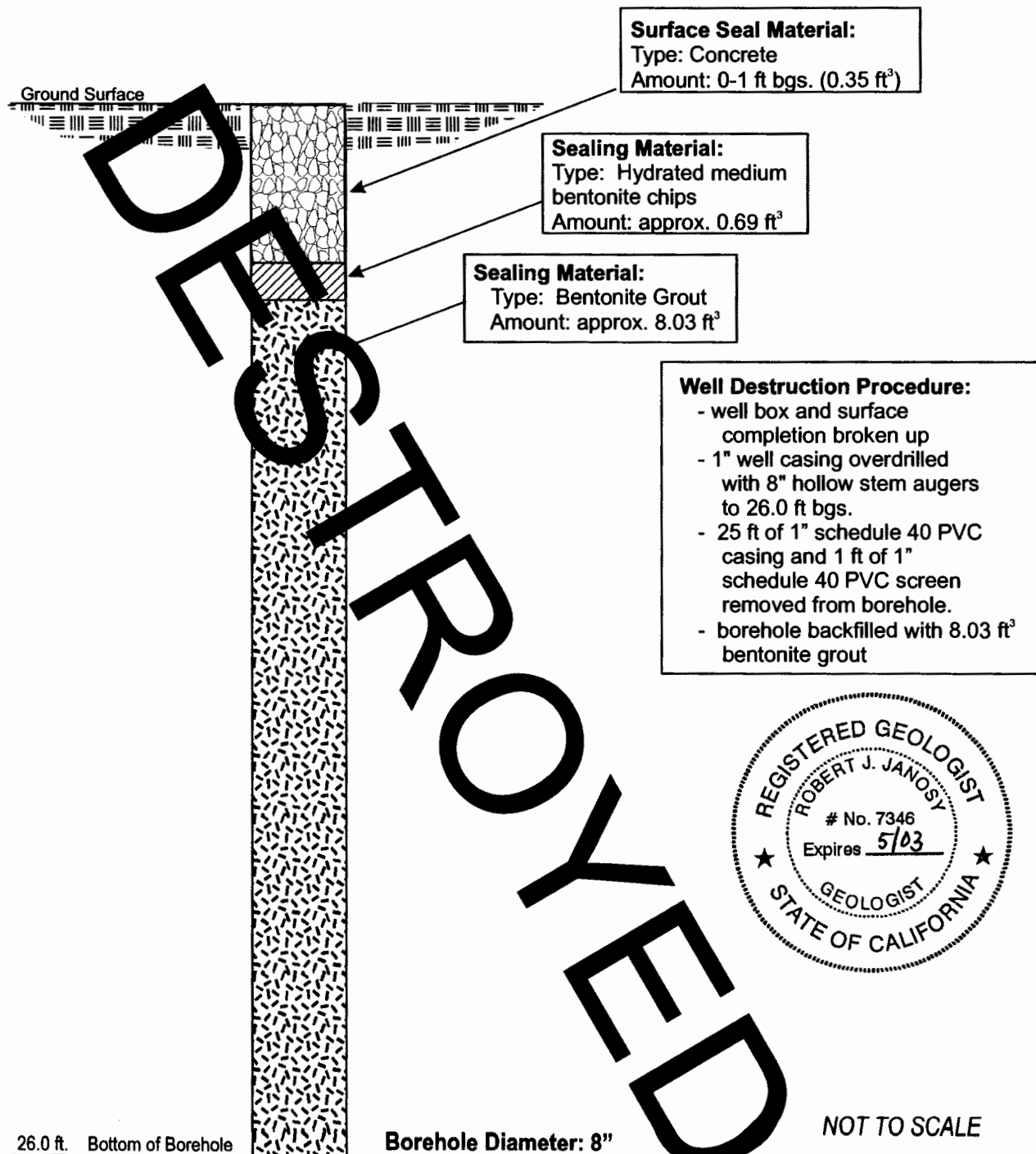
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW10**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069920.2709
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/16/99 Date Destroyed: 10/23/02	Easting: 6207410.9487
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.45 ft



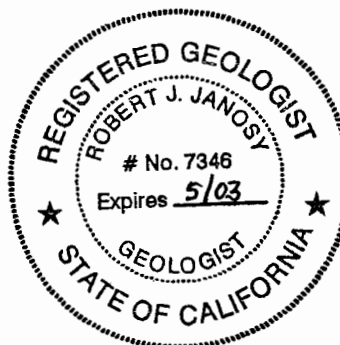
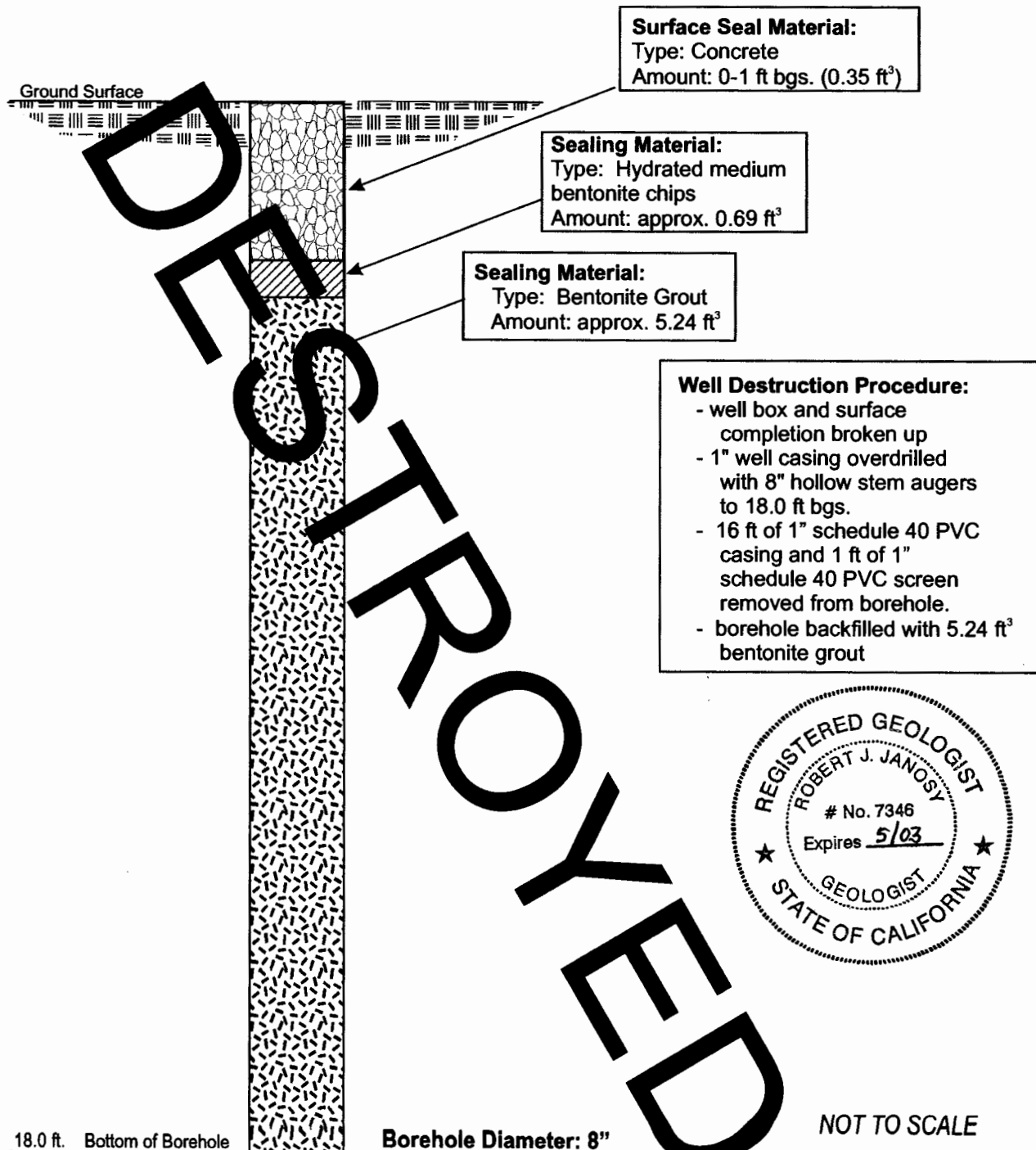
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW11**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069919.5963
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/16/99 Date Destroyed: 10/23/02	Easting: 6207423.0914
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.39 ft



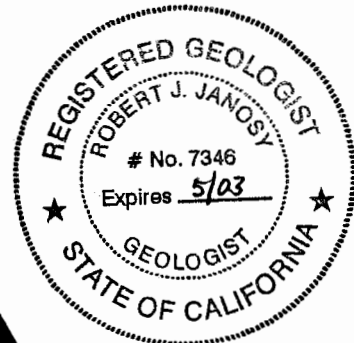
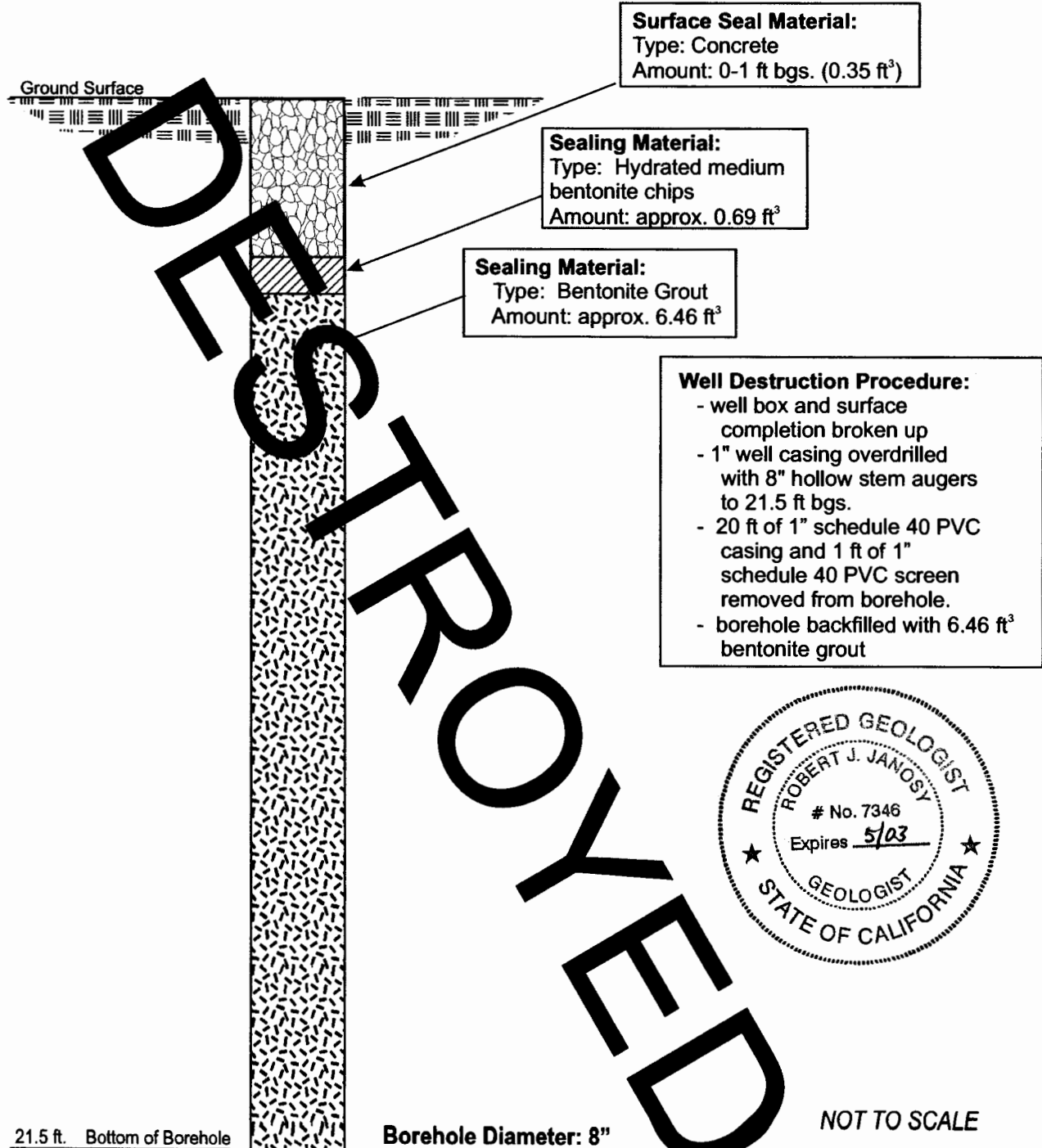
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW12**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069934.7291
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/16/99 Date Destroyed: 10/23/02	Easting: 6207419.6999
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.41 ft



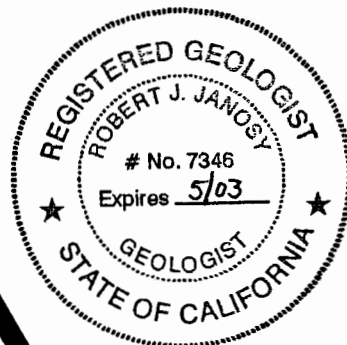
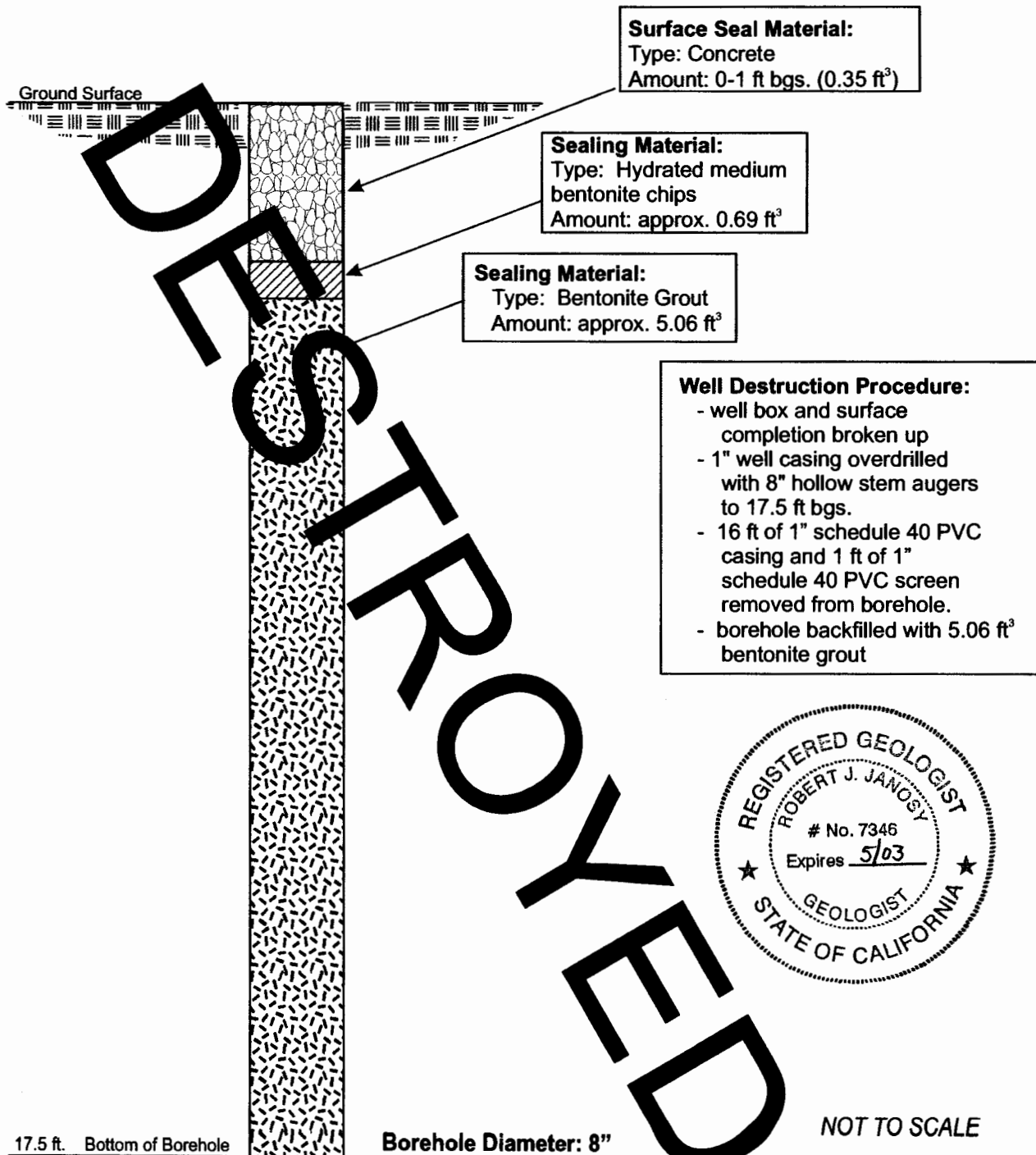
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW13**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069942.6710
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/16/99 Date Destroyed: 10/21/02	Easting: 6207439.5197
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.58 ft



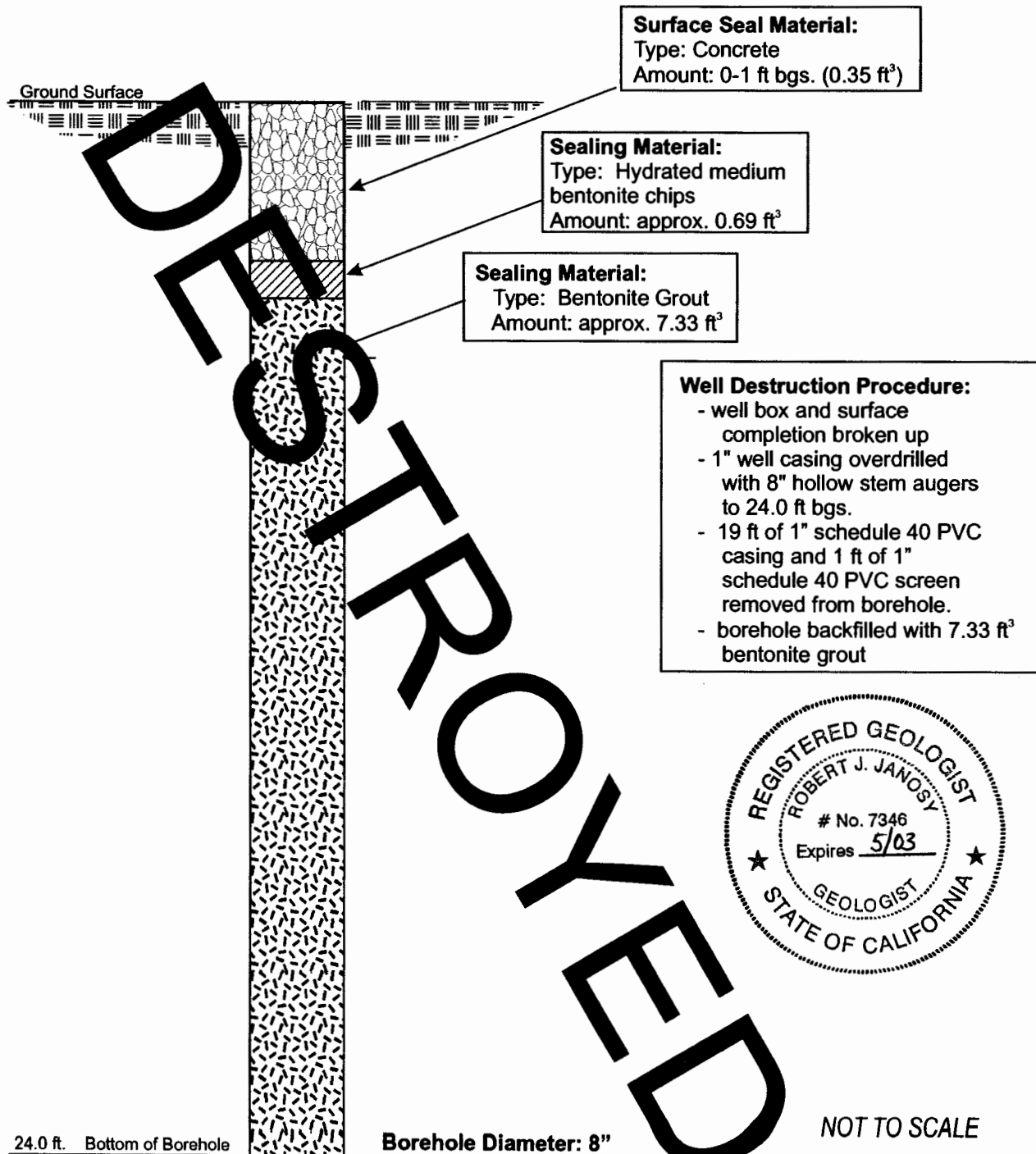
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW14**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069959.3631
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/16/99 Date Destroyed: 10/21/02	Easting: 6207433.2433
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.03 ft



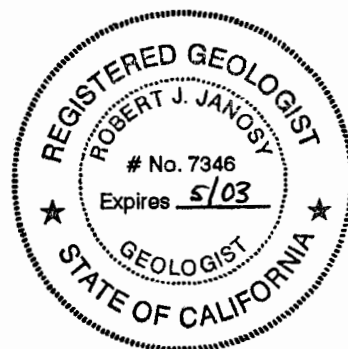
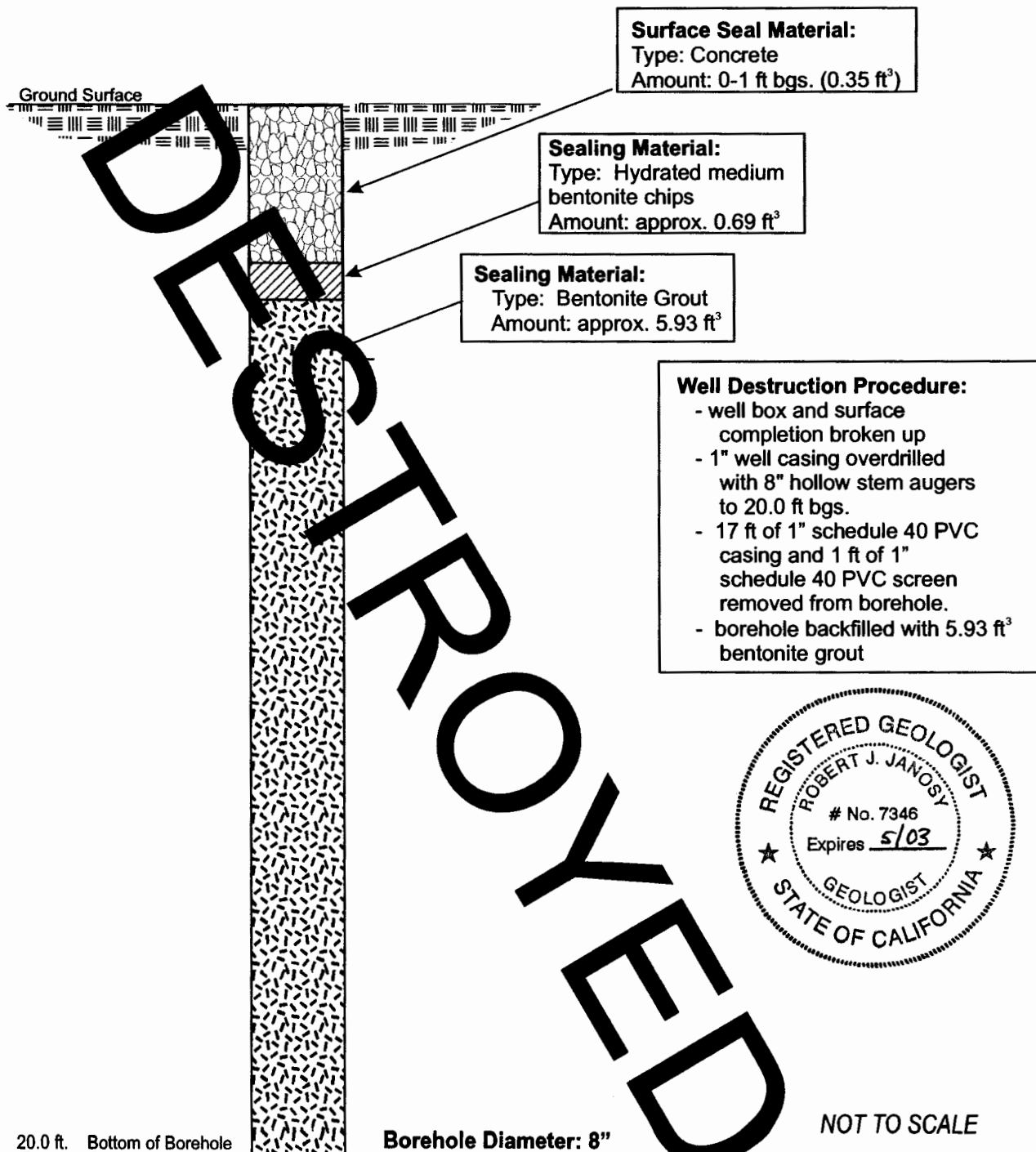
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW15**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069957.5929
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/17/99 Date Destroyed: 10/21/02	Easting: 6207453.1146
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.70 ft



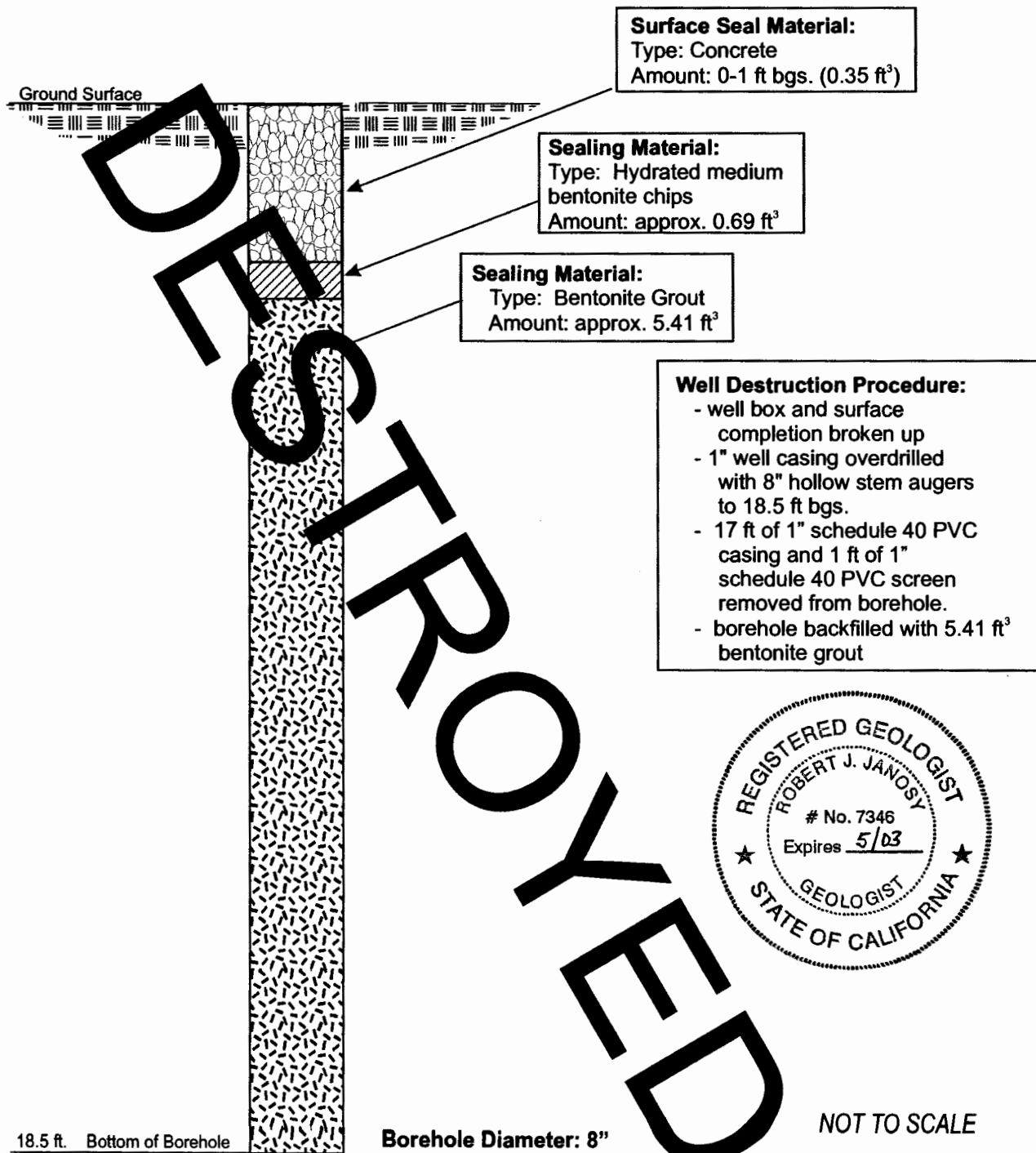
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW16**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069979.0415
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/17/99 Date Destroyed: 10/21/02	Easting: 6207458.5315
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.33 ft



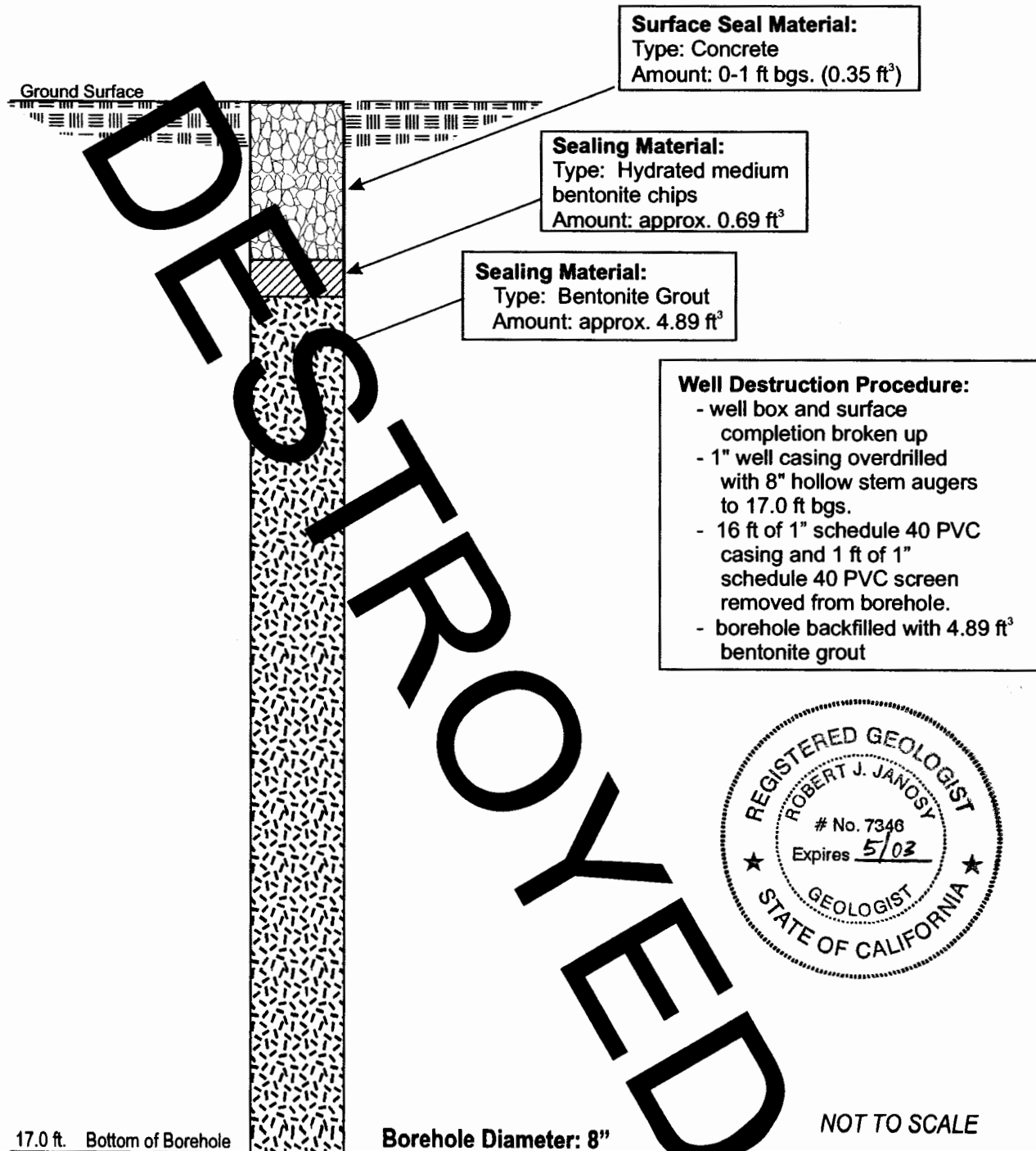
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW17**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069952.3257
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/17/99 Date Destroyed: 10/22/02	Easting: 6207418.6005
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.27 ft



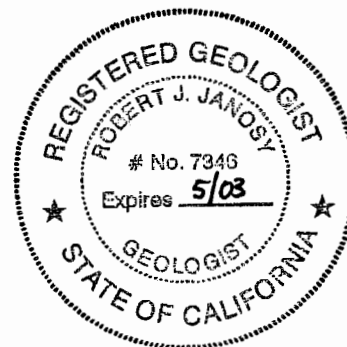
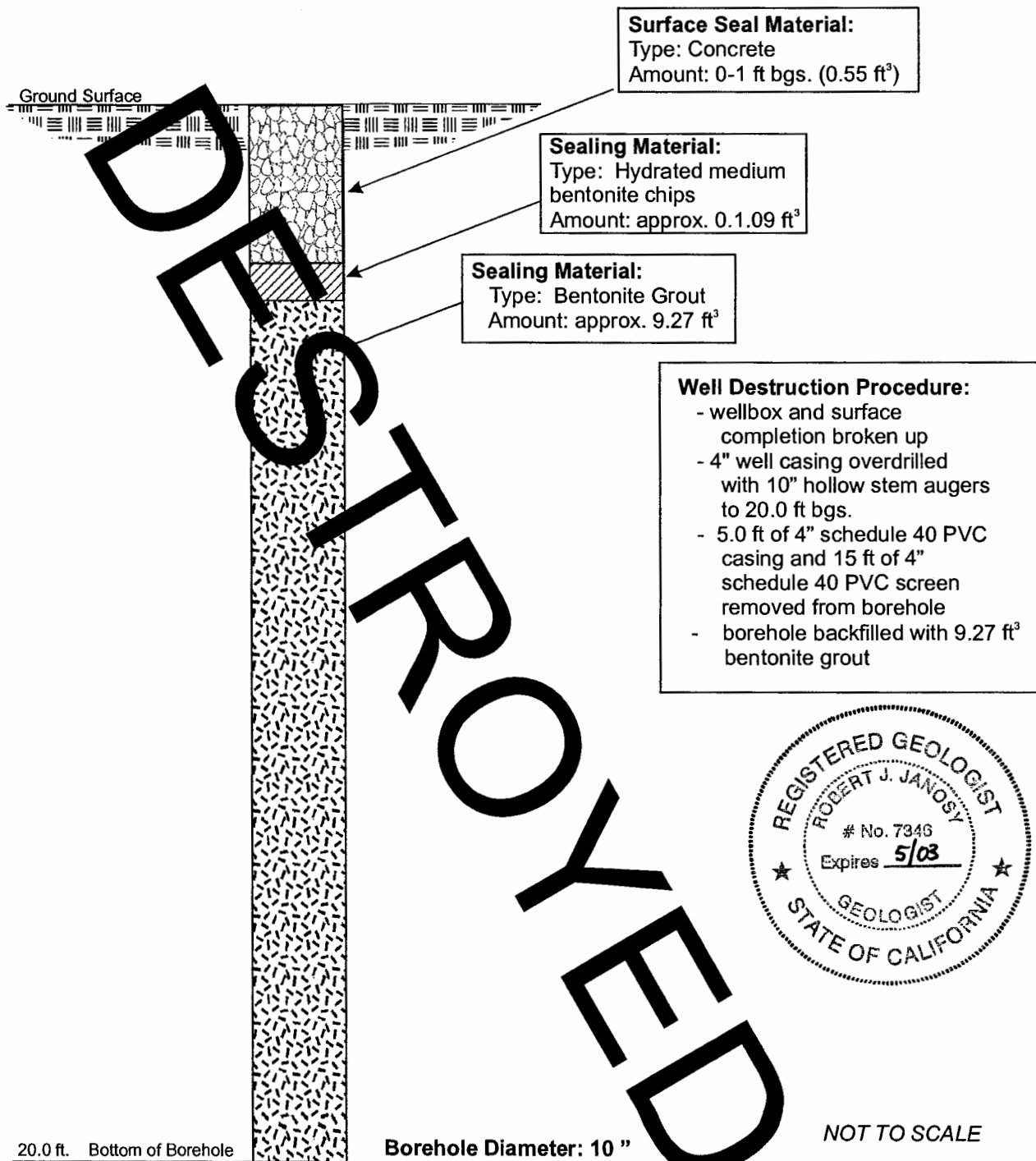
**MCB CAMP PENDLETON
SPARGE WELL
DESTRUCTION DIAGRAM
43286-SW18**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069970.1476
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/17/99 Date Destroyed: 10/21/02	Easting: 6207413.3019
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.29 ft



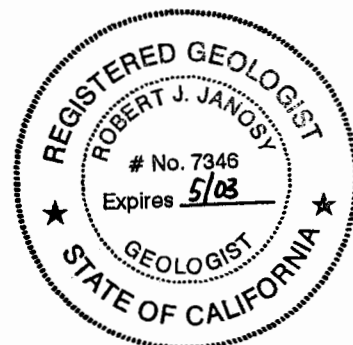
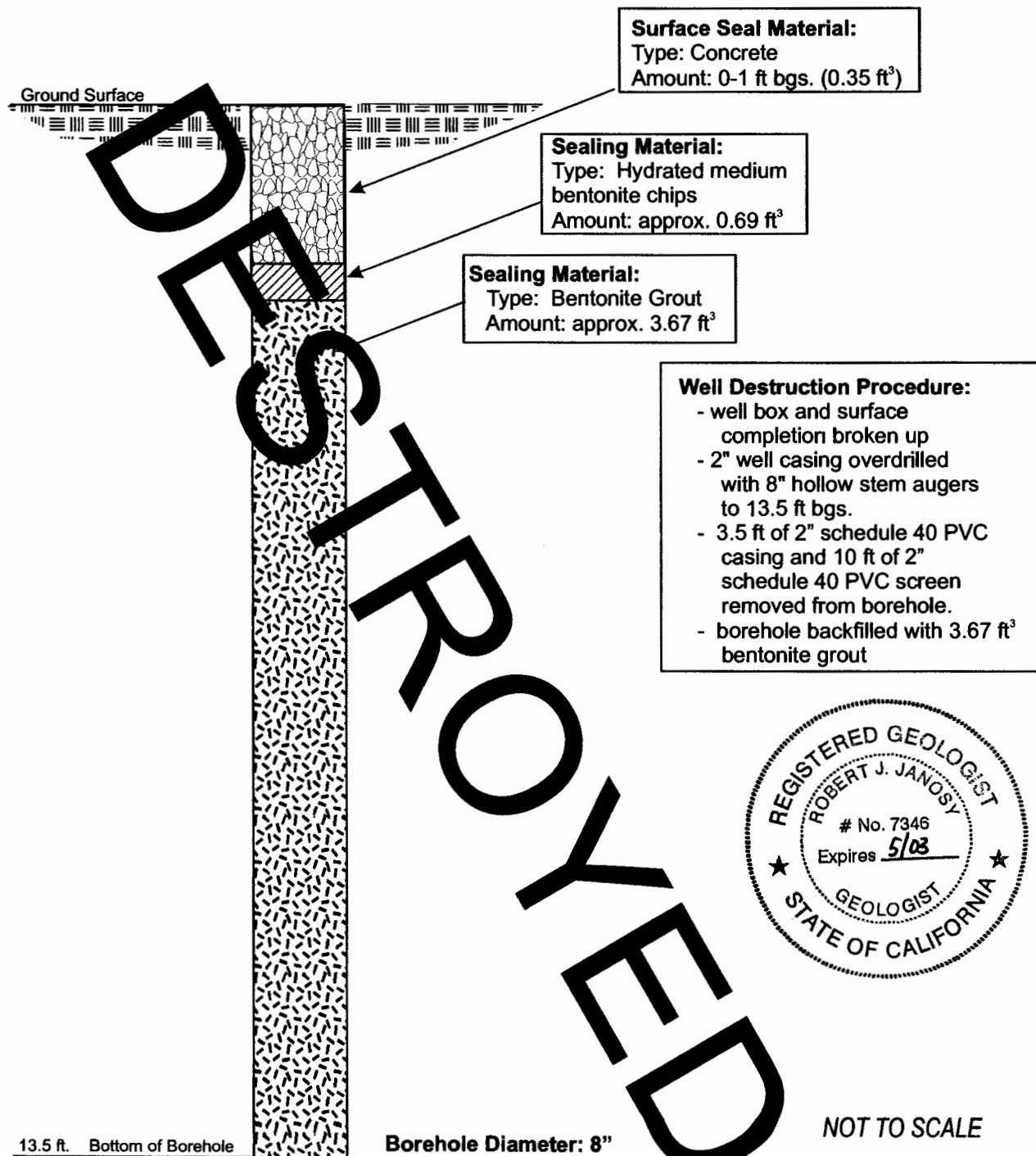
MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-43VIEW1

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: NA
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/95 Date Destroyed: 10/25/02	Easting: NA
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: NA



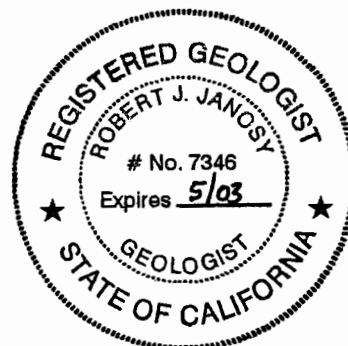
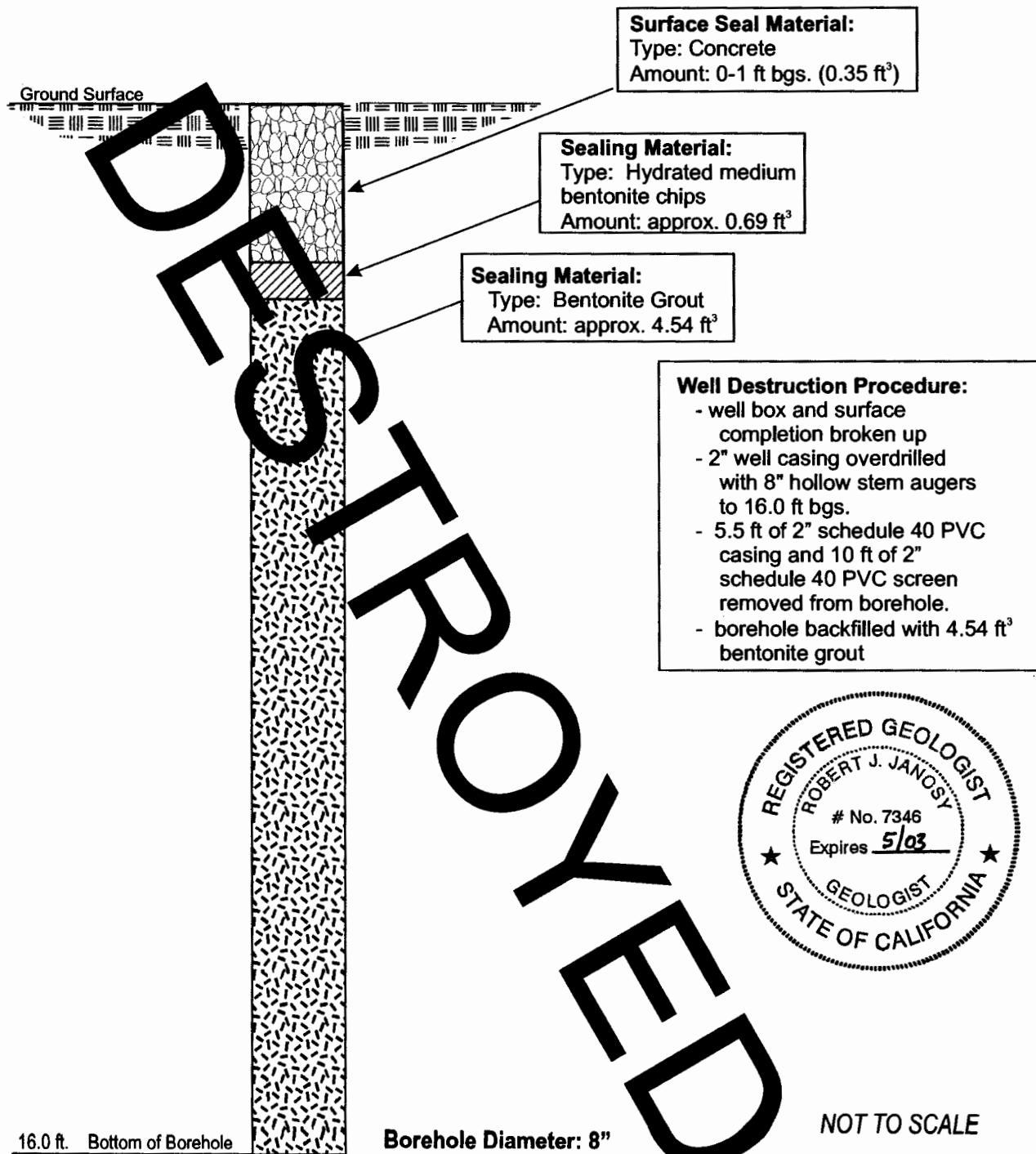
MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-SVE1

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2070012.9780
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/22/02	Easting: 6207377.9209
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 219.01 ft



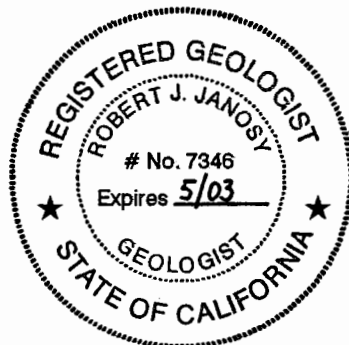
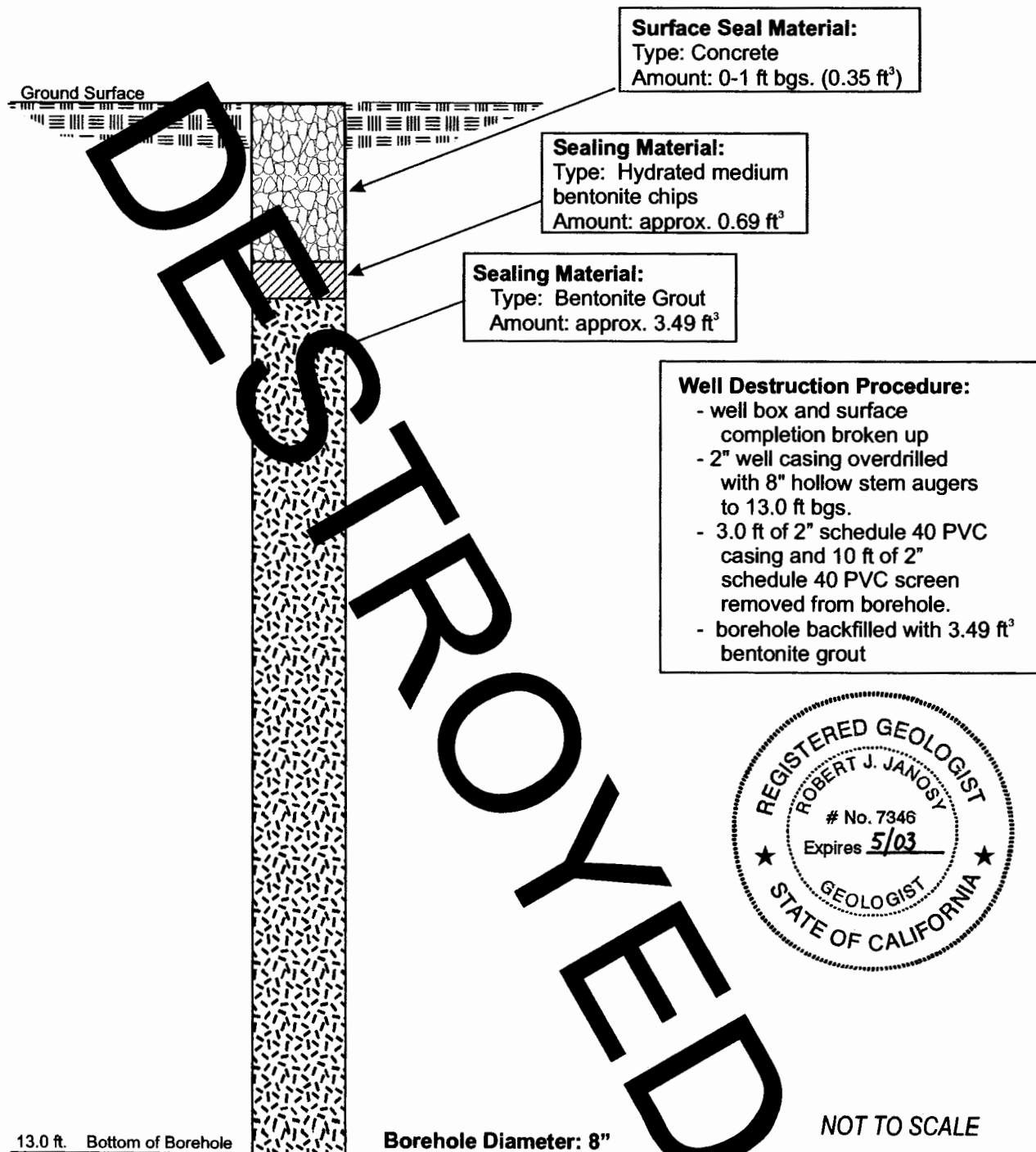
MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-SVE2

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069949.7909
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/31/02	Easting: 6207377.9511
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.91 ft



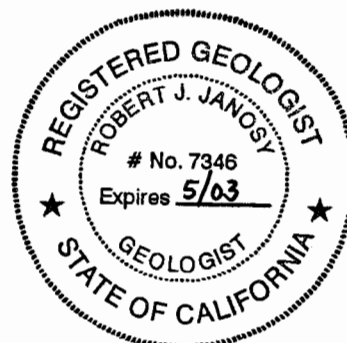
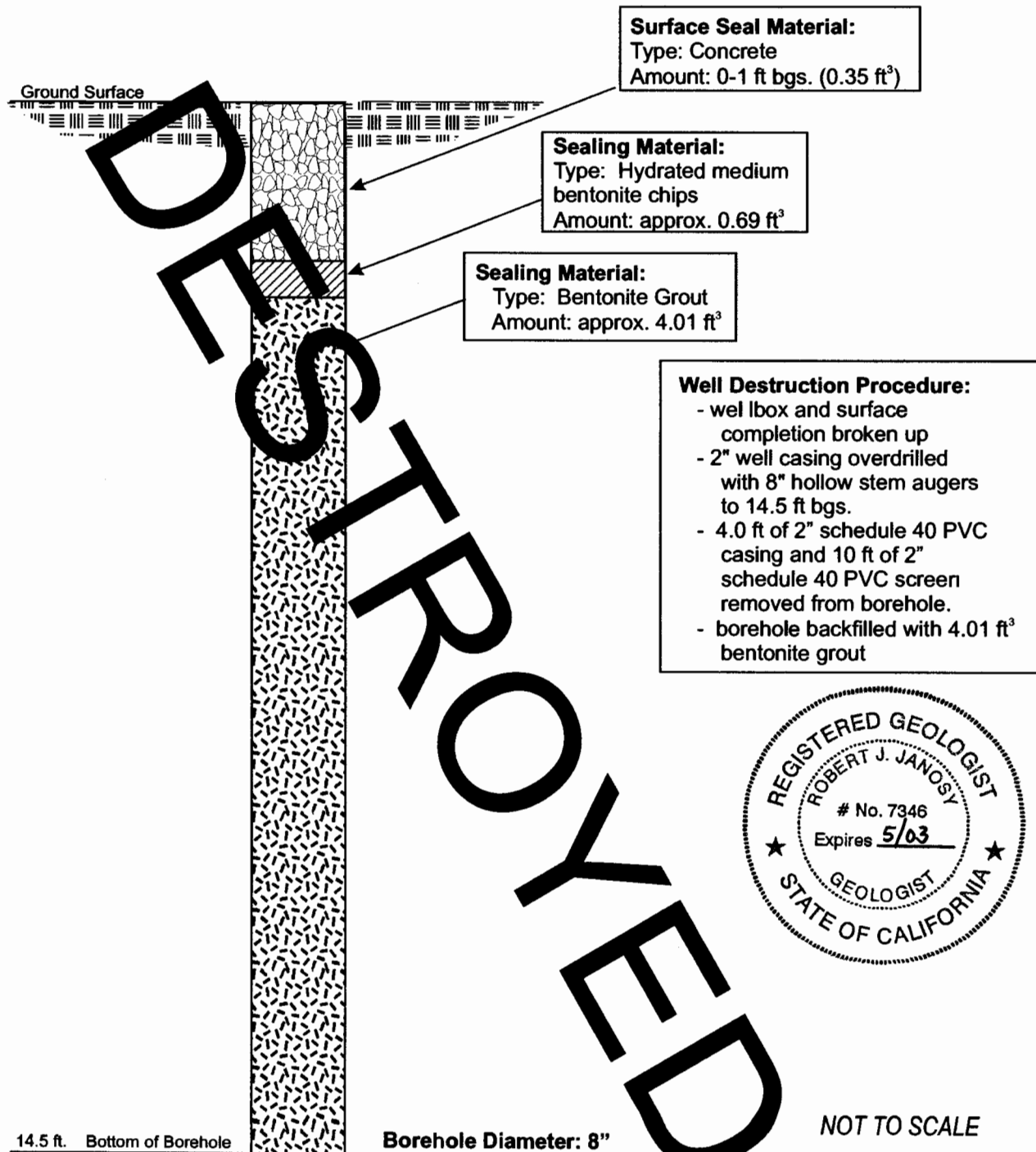
MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-SVE3

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069962.5820
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/22/02	Easting: 6207407.3329
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.0 ft



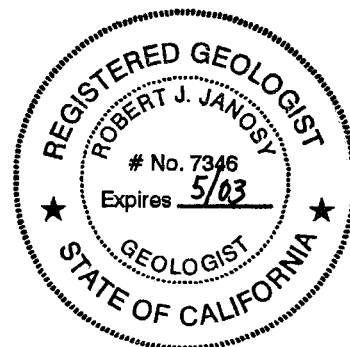
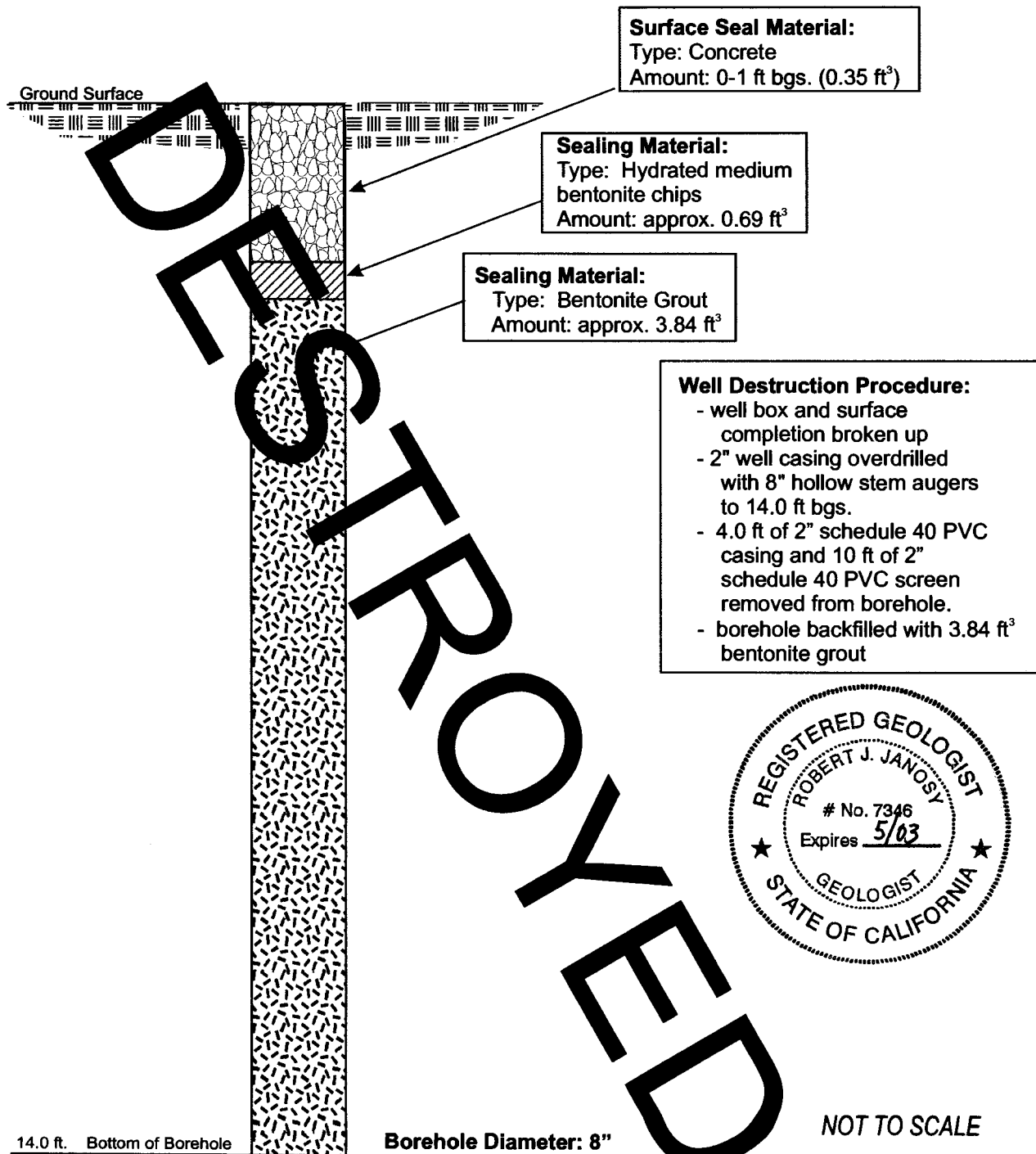
MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-SVE4

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069988.0236
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/22/02	Easting: 6207404.6615
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.07 ft



MCB CAMP PENDLETON SOIL VAPOR EXTRACTION WELL DESTRUCTION DIAGRAM 43286-SVE5

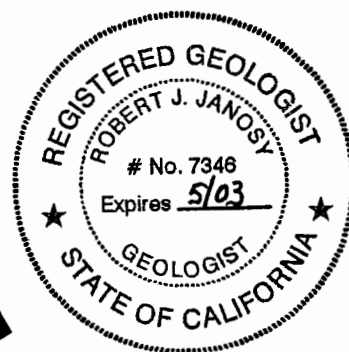
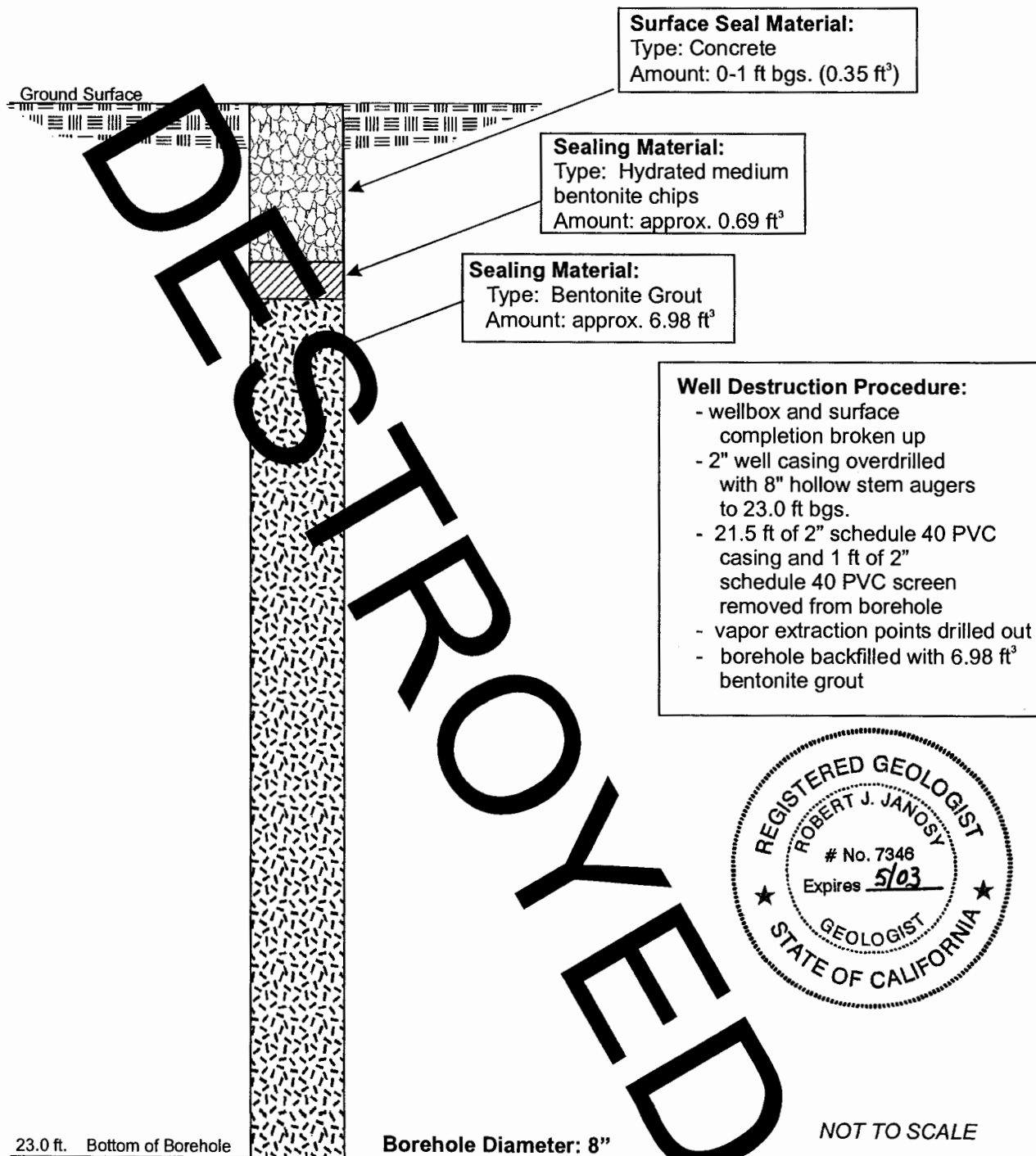
Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: NA
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/24/98 Date Destroyed: 10/21/02	Easting: NA
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: NA



NA = Not Available

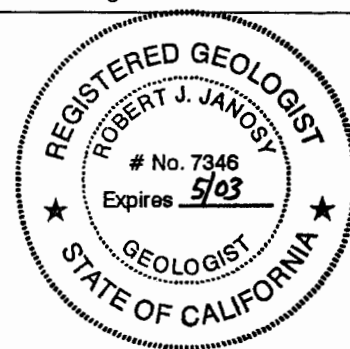
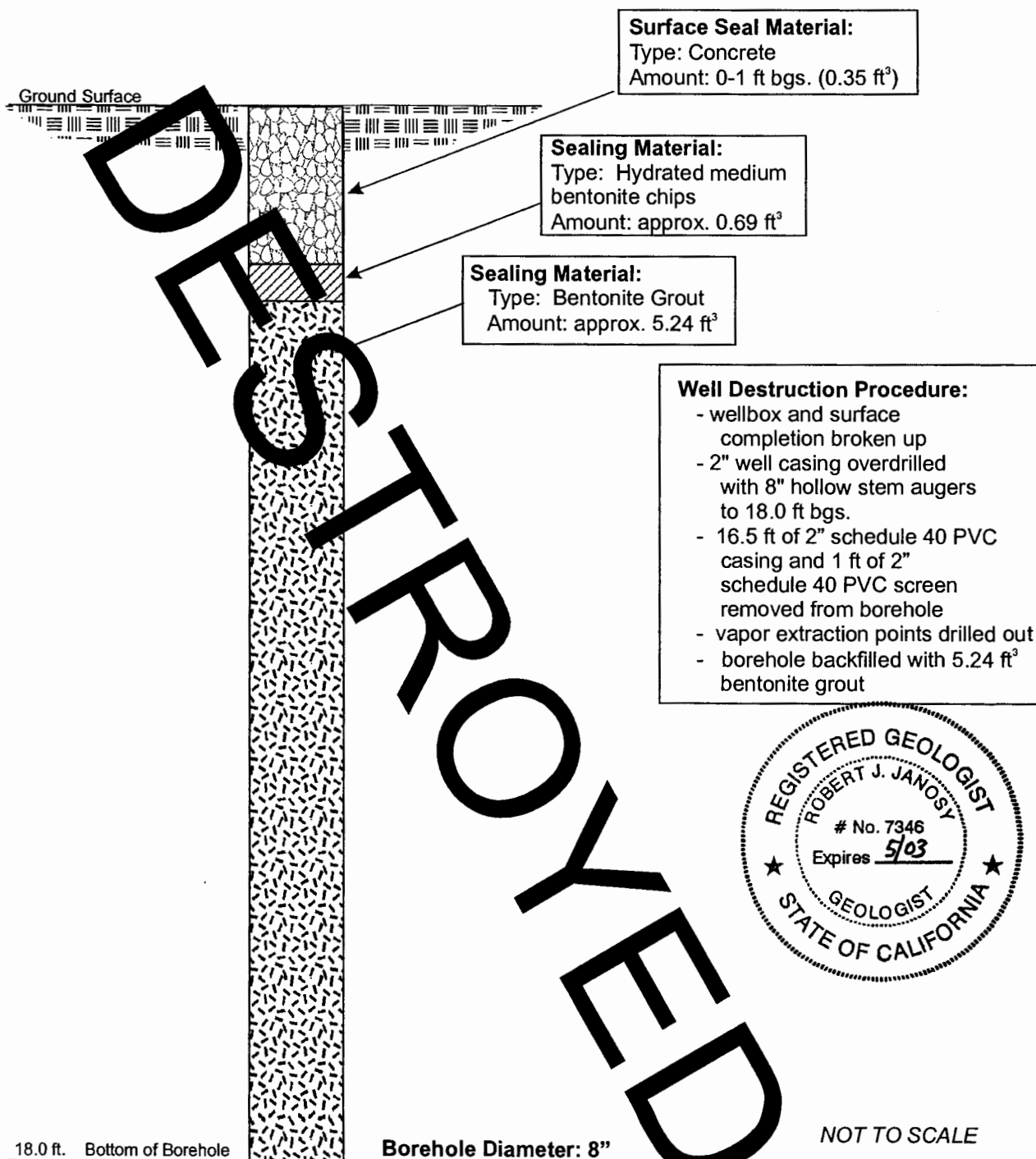
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP1A**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069978.396
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/26/98 Date Destroyed: 10/23/02	Easting: 6207383.098
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.80 ft



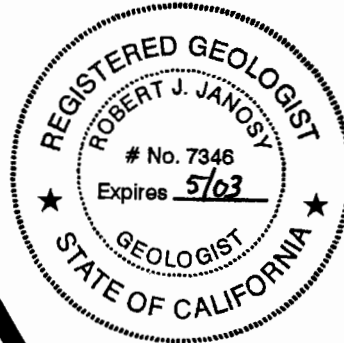
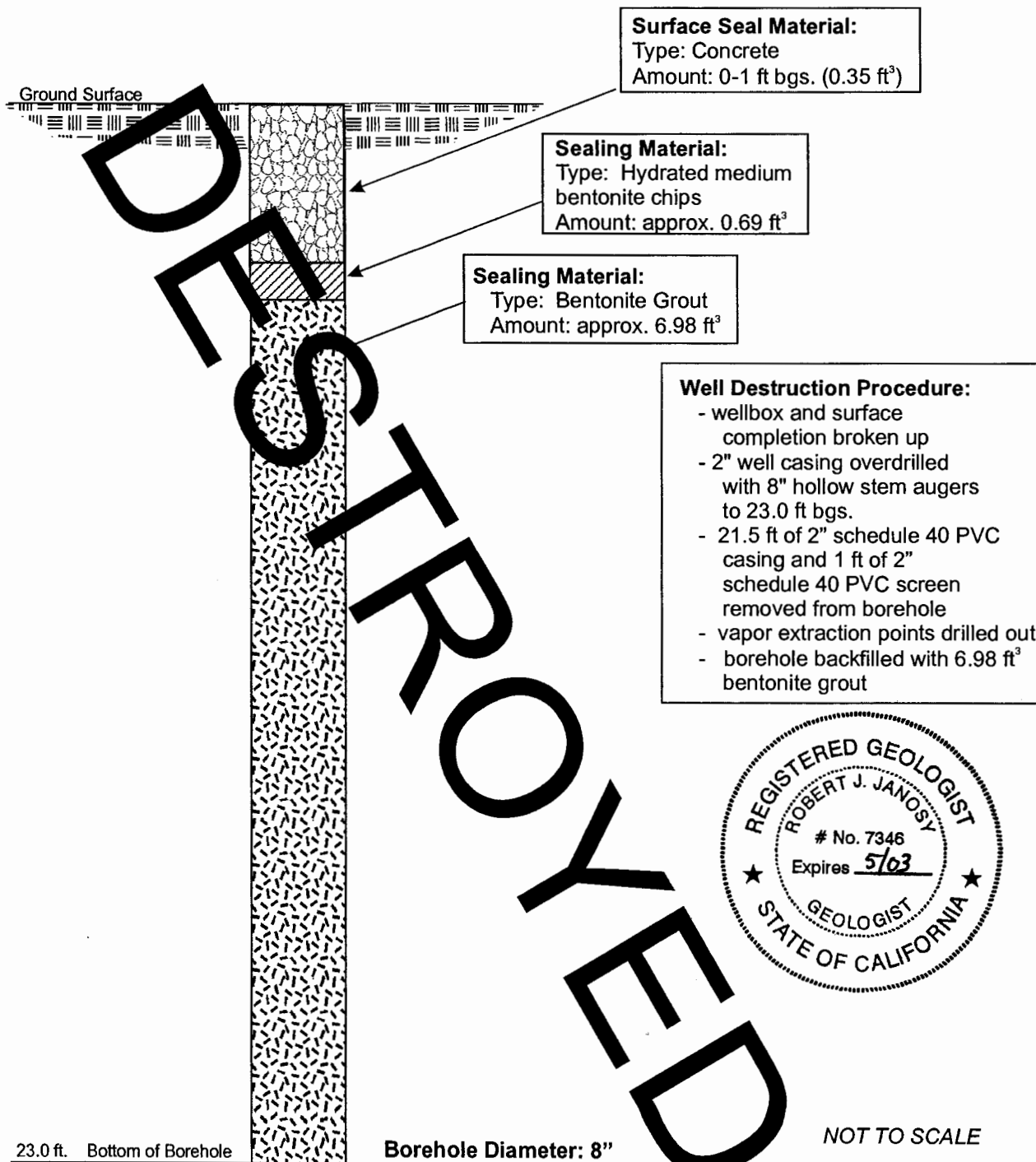
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP1B**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069876.473
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/23/02	Easting: 6207386.813
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.66 ft



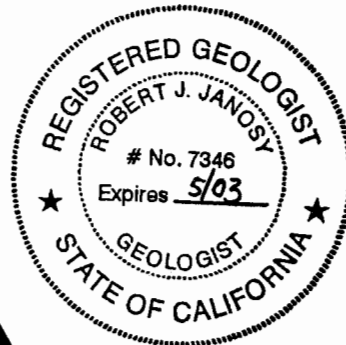
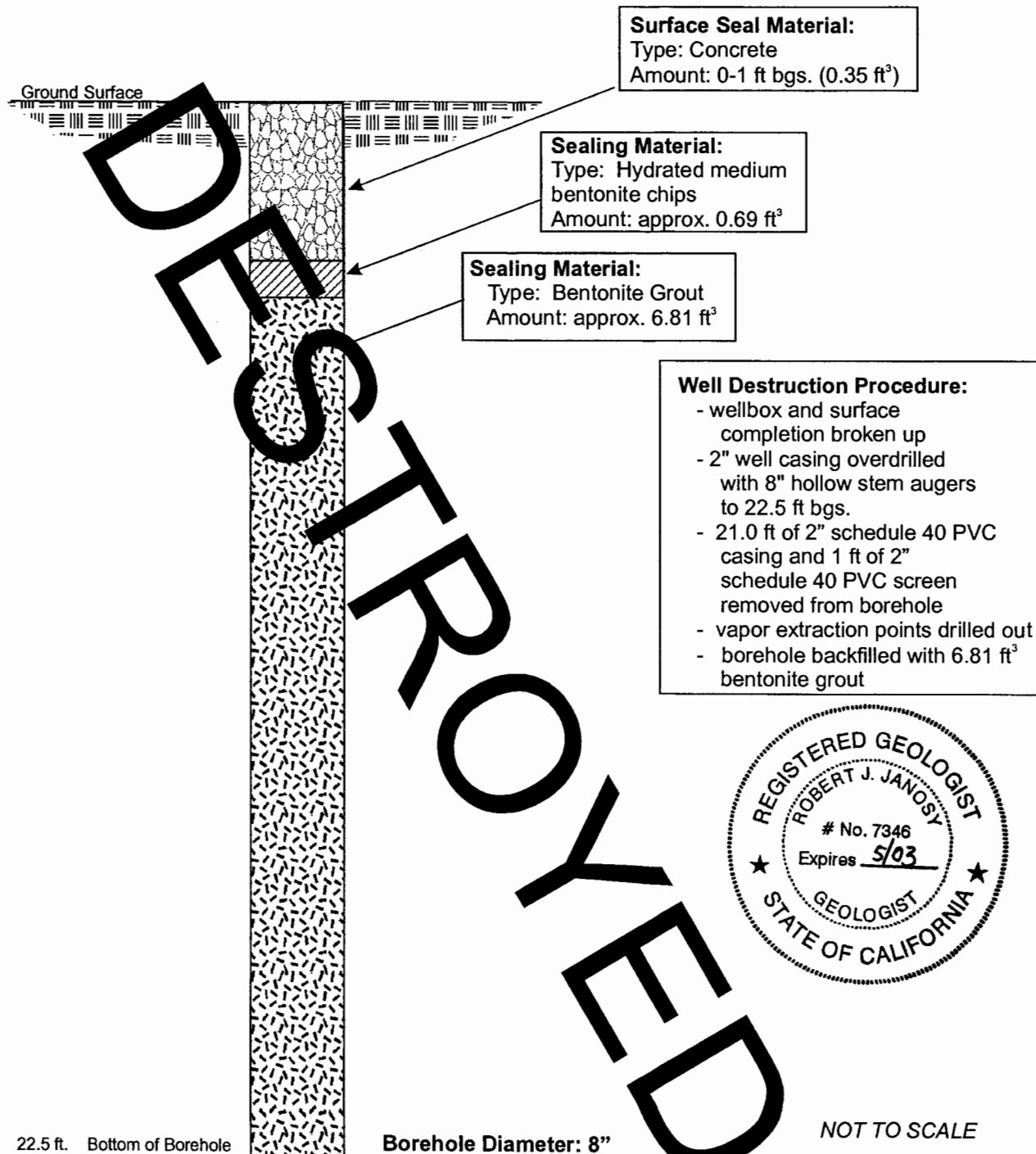
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP1C**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069877.572
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/25/02	Easting: 6207373.393
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 217.8 ft



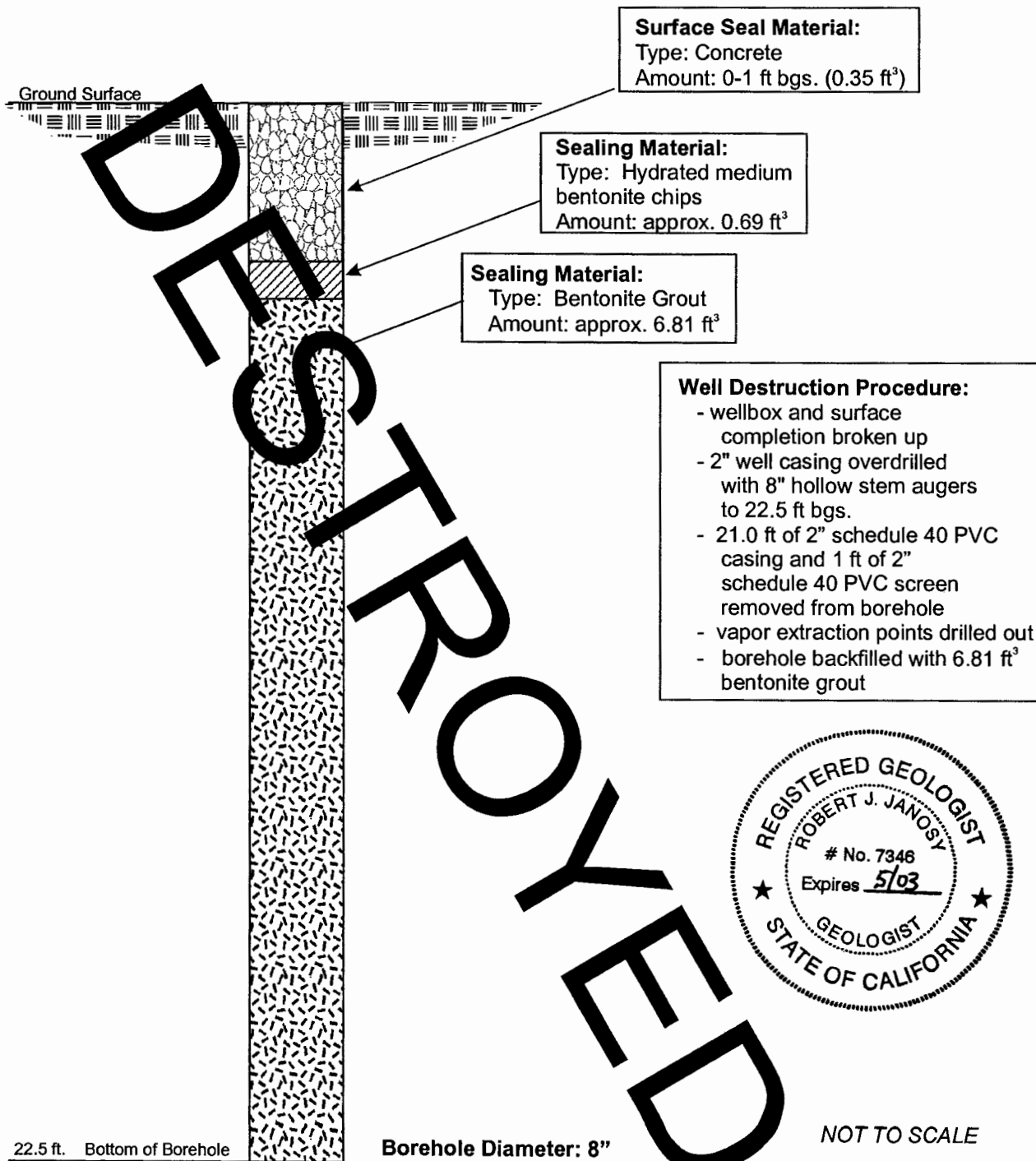
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP2A**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069958.633
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/26/98 Date Destroyed: 10/21/02	Easting: 6207409.343
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.34 ft



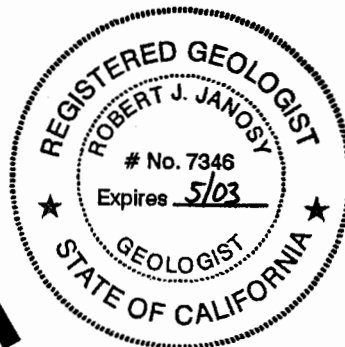
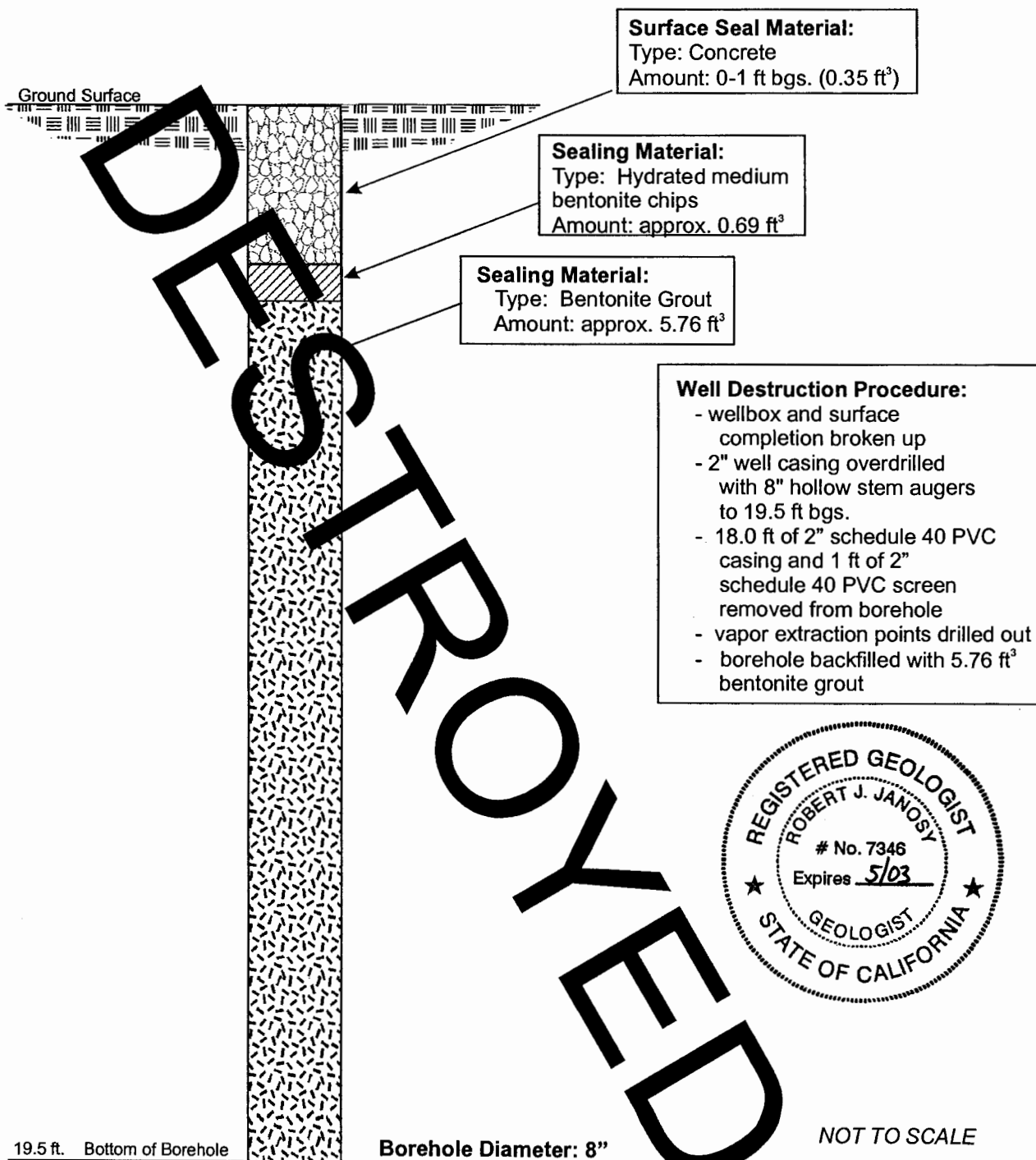
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP2B**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069956.574
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/26/98 Date Destroyed: 10/21/02	Easting: 6207411.979
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.55 ft



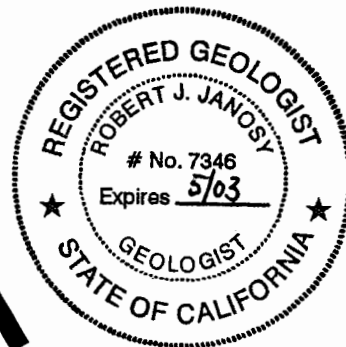
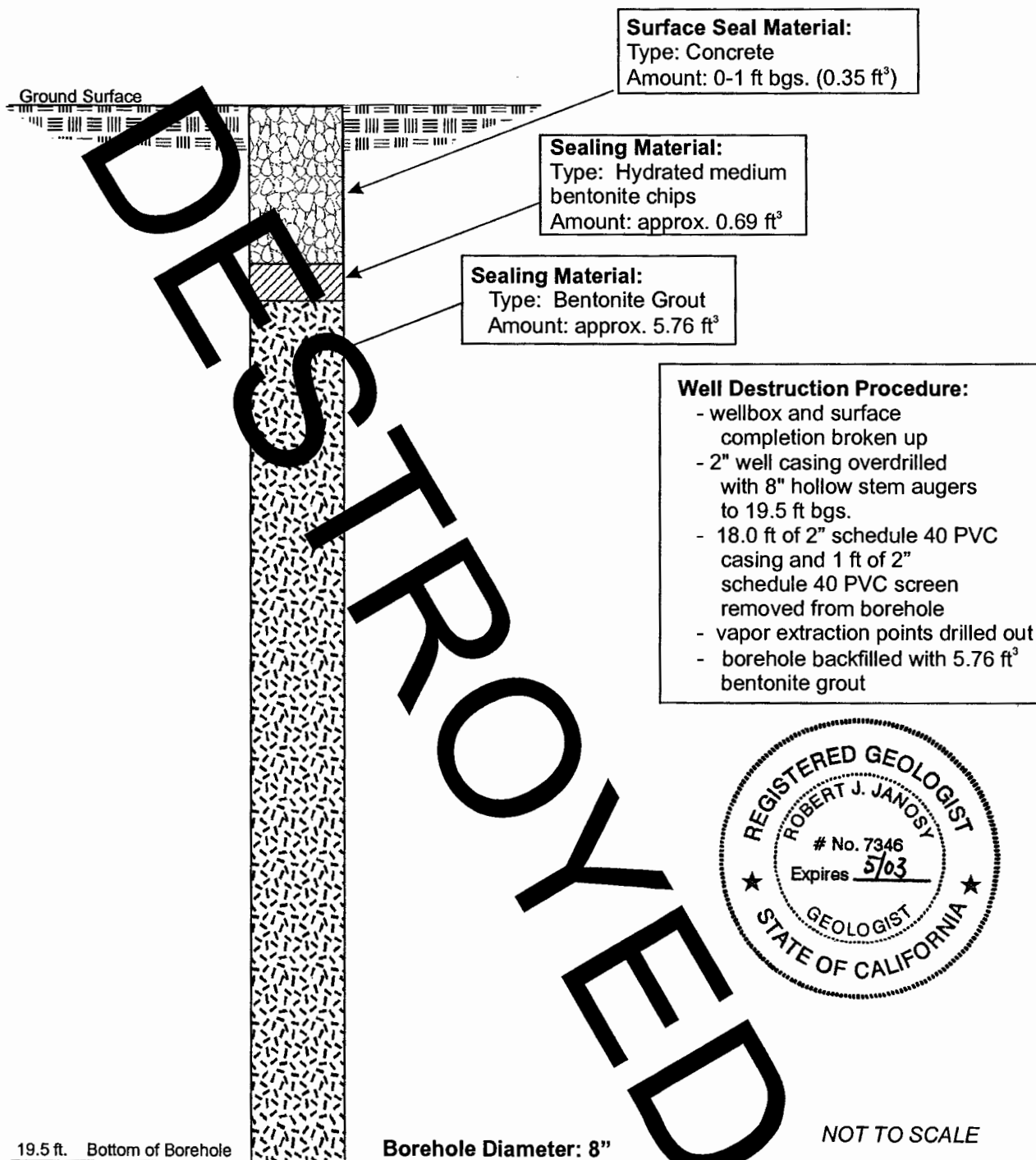
MCB CAMP PENDLETON MONITORING POINT DESTRUCTION DIAGRAM 43286-MP2C

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069952.458
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/26/98 Date Destroyed: 10/23/02	Easting: 6207413.093
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.32 ft



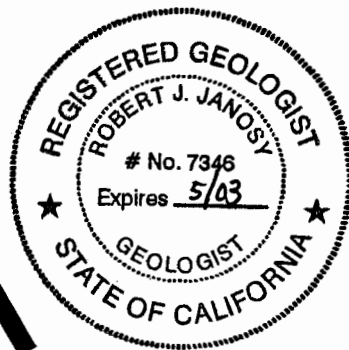
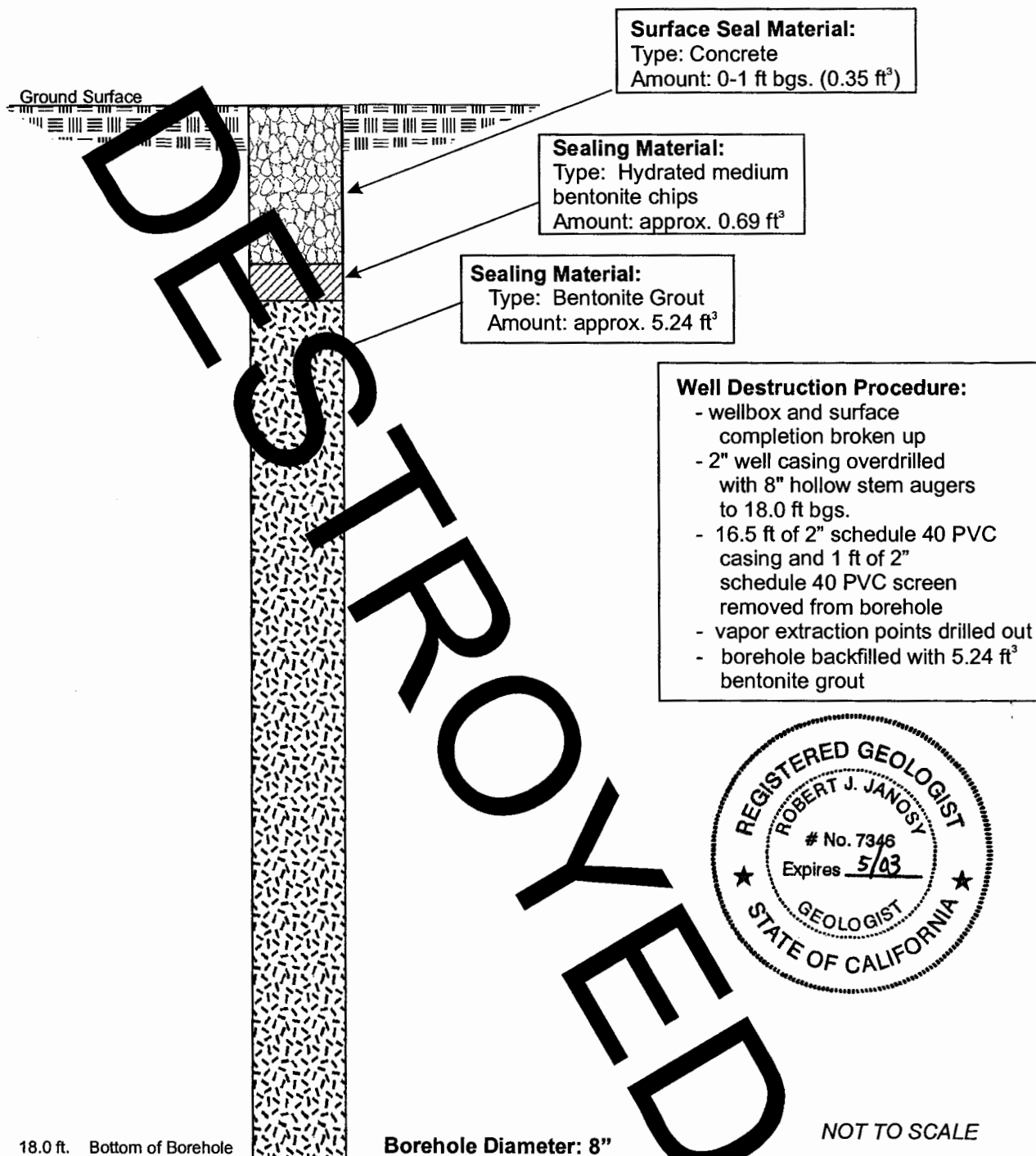
MCB CAMP PENDLETON MONITORING POINT DESTRUCTION DIAGRAM 43286-MP2D

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069948.741
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/26/98 Date Destroyed: 10/22/02	Easting: 6207415.813
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.30 ft



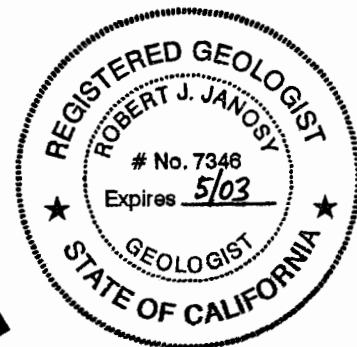
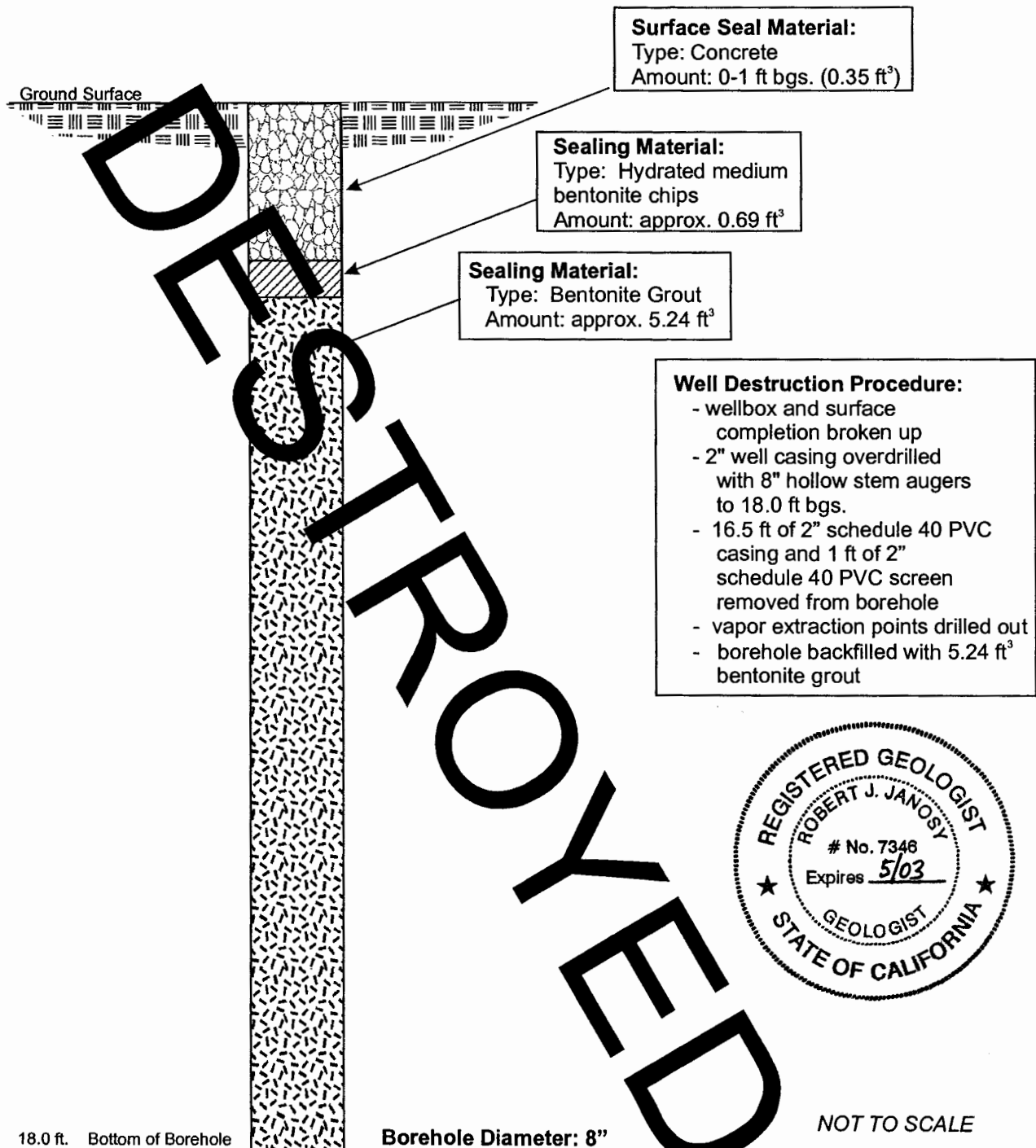
MCB CAMP PENDLETON MONITORING POINT DESTRUCTION DIAGRAM 43286-MP3A

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2070002.116
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/22/02	Easting: 6207392.290
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.70 ft



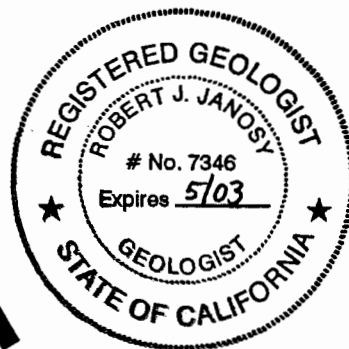
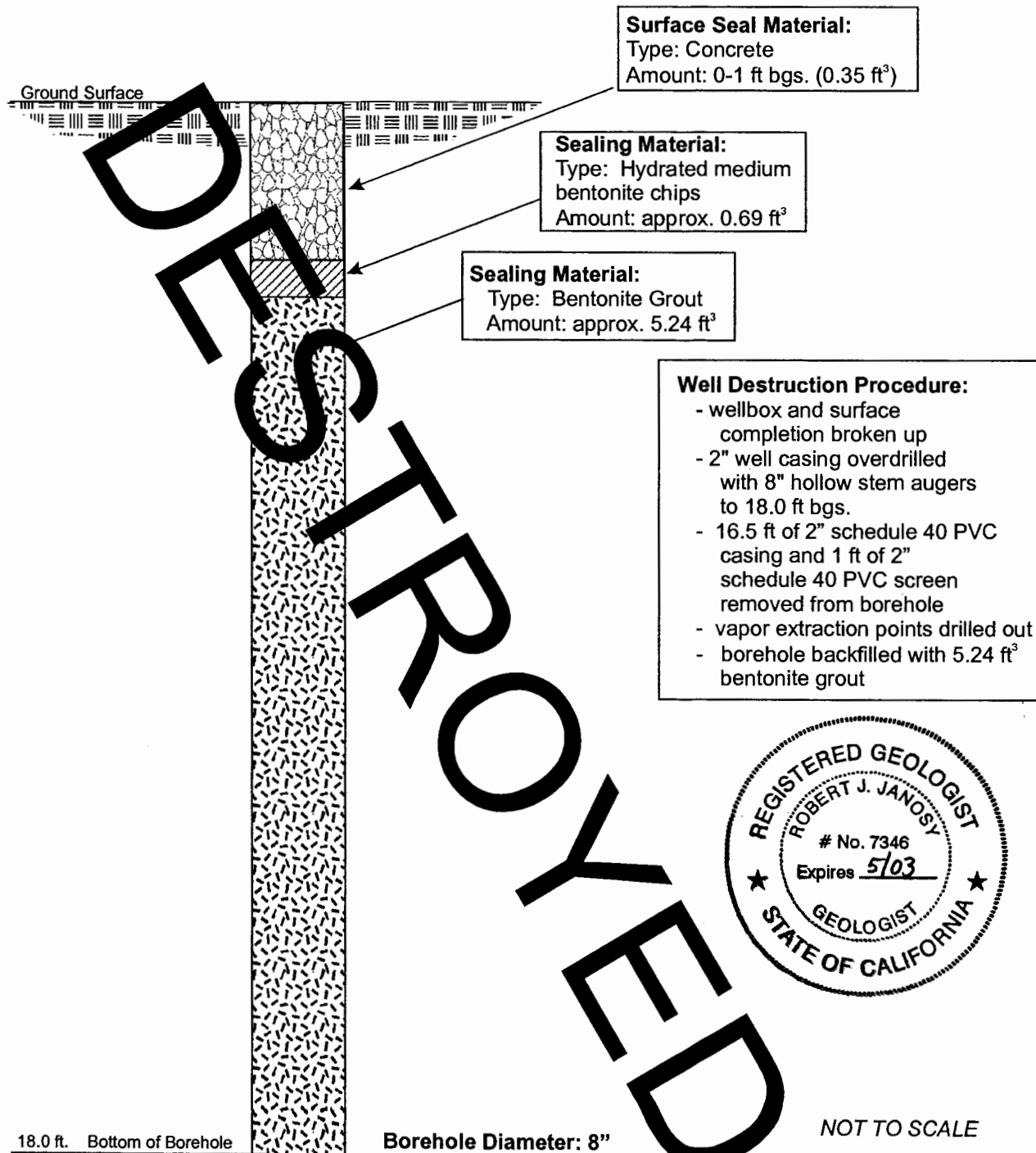
MCB CAMP PENDLETON MONITORING POINT DESTRUCTION DIAGRAM 43286-MP3B

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069996.62
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/22/02	Easting: 6207399.635
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.49 ft



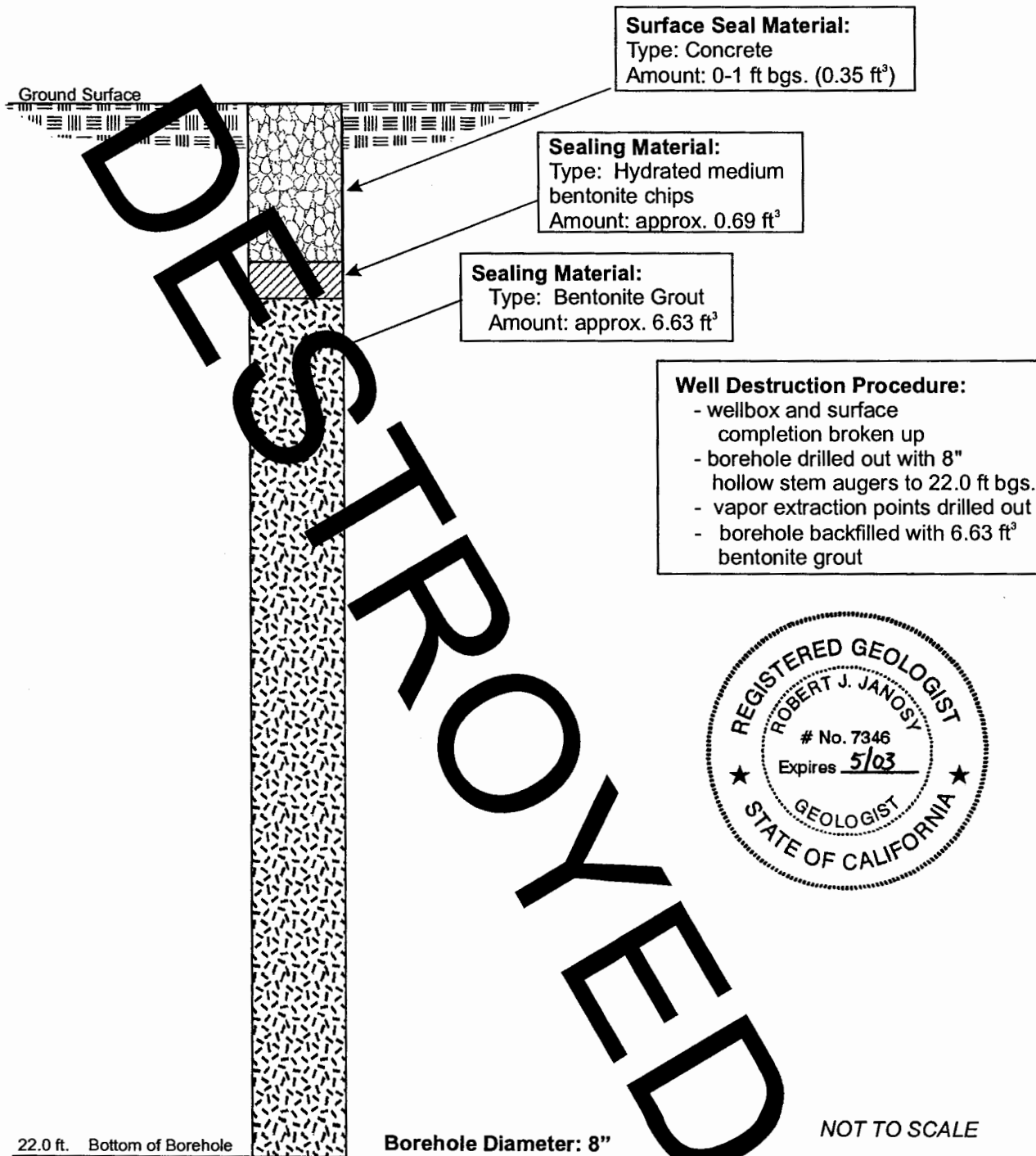
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP3C**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069994.521
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 10/25/98 Date Destroyed: 10/22/02	Easting: 6207413.936
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.35 ft



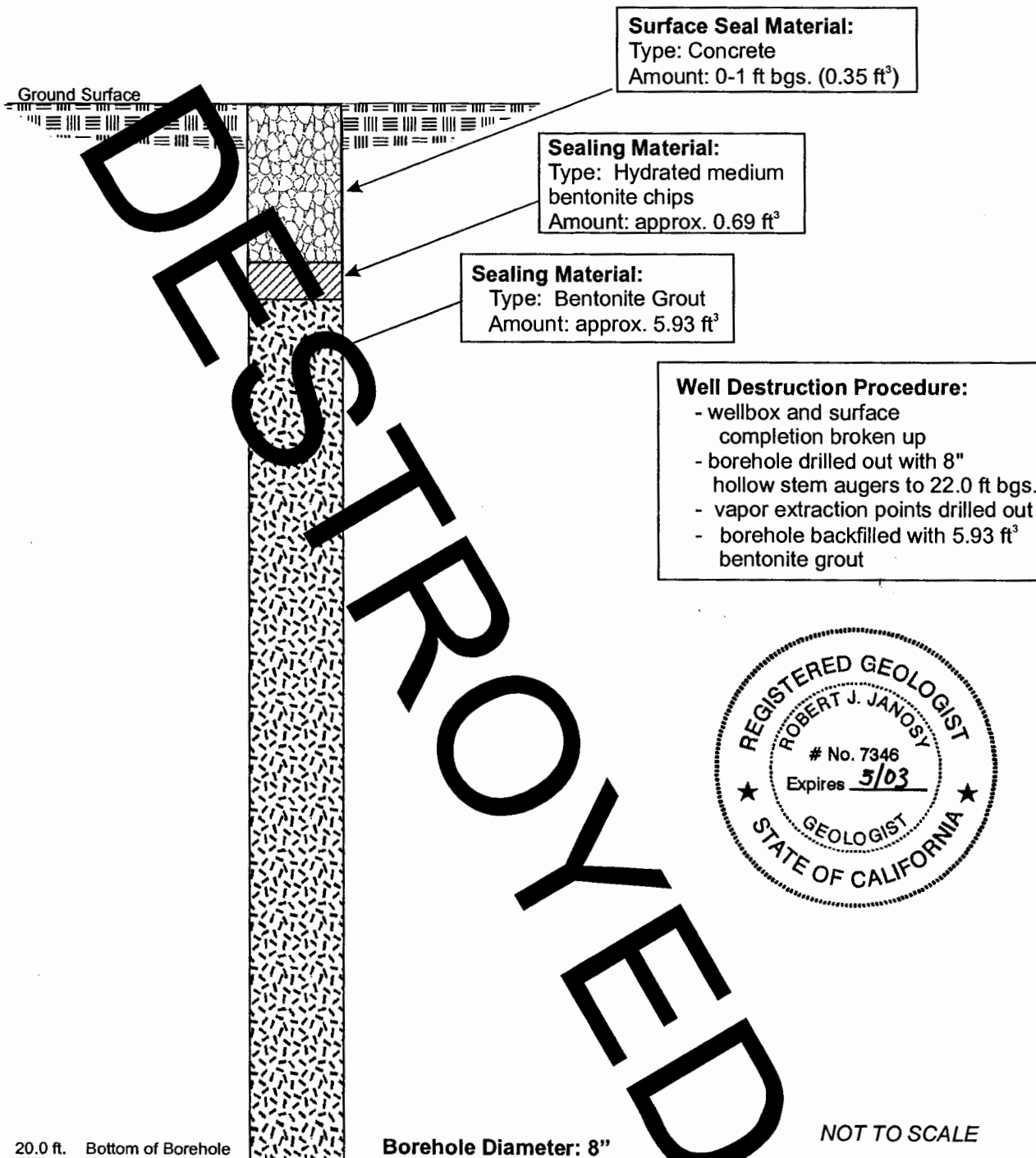
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP4**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069915.6112
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 2/16/99 Date Destroyed: 10/23/02	Easting: 6207413.936
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.35 ft



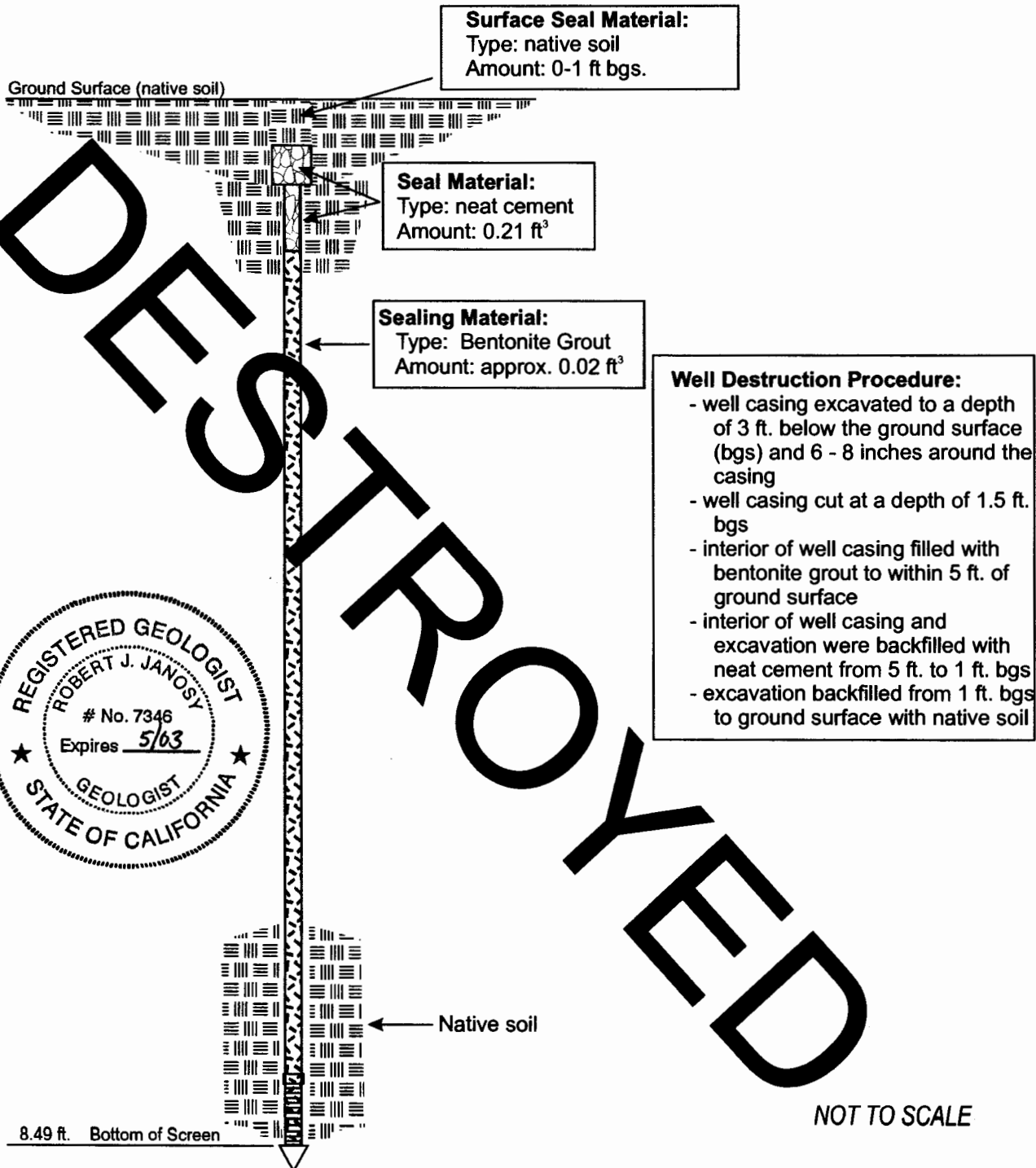
**MCB CAMP PENDLETON
MONITORING POINT
DESTRUCTION DIAGRAM
43286-MP5**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069961.191
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 2/17/99 Date Destroyed: 10/23/02	Easting: 6207448.894
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 218.42 ft



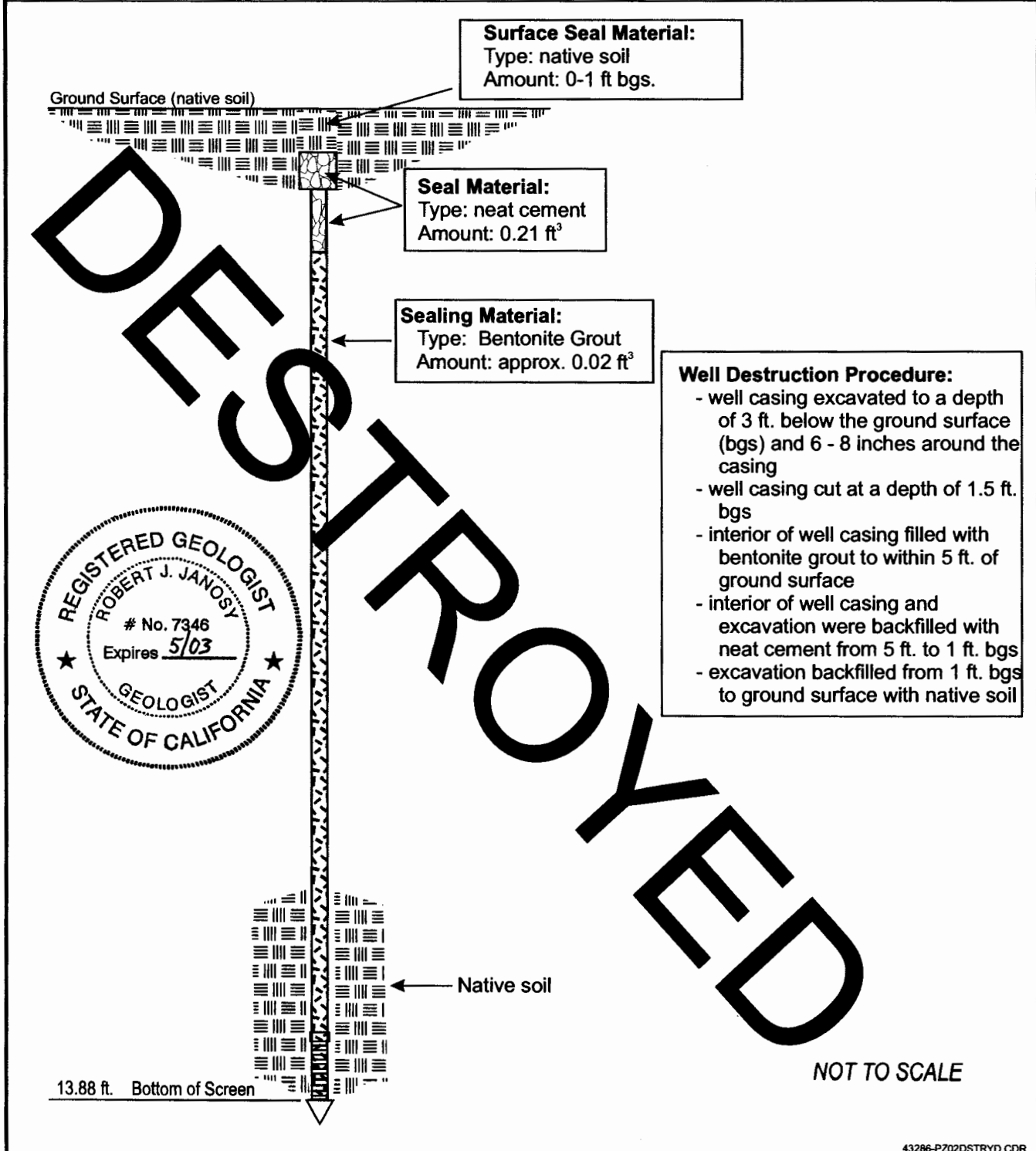
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ01**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069845.1869
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/09/99 Date Destroyed: 11/04/02	Easting: 6207424.8656
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 201.64 ft



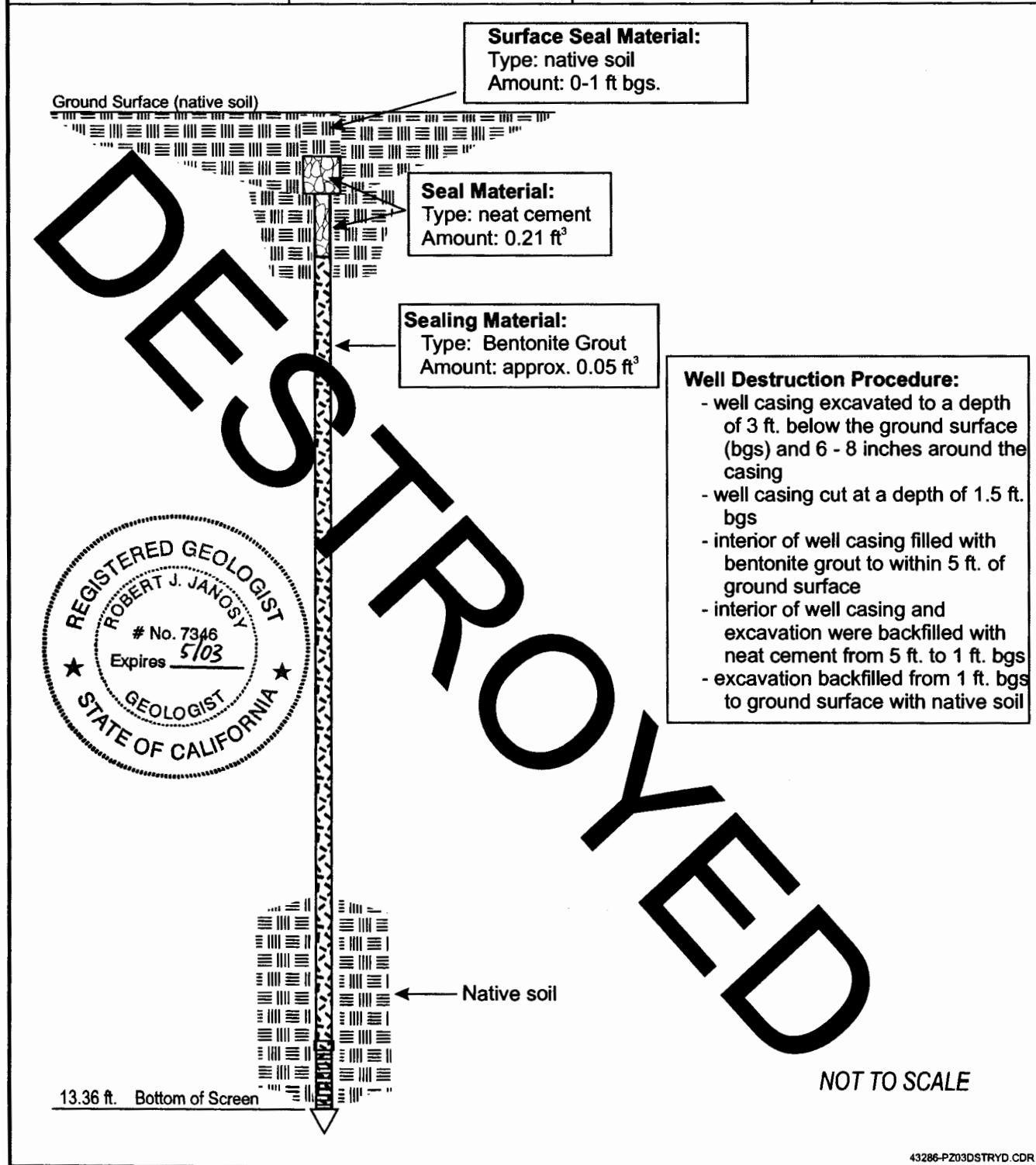
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ02**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069810.5660
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/10/99 Date Destroyed: 11/04/02	Easting: 6207451.3860
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 203.36 ft



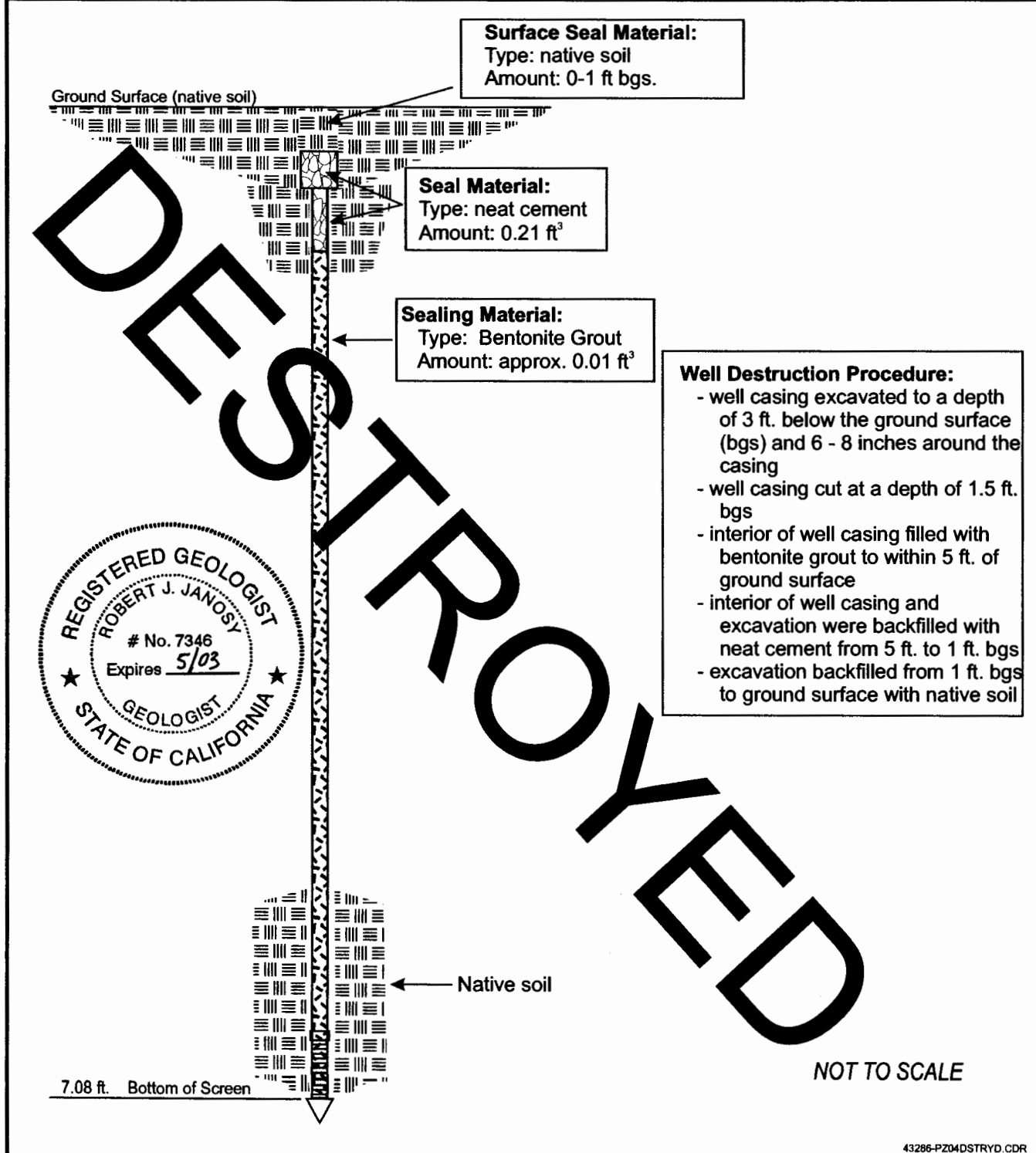
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ03**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069749.8890
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/10/99 Date Destroyed: 11/04/02	Easting: 6207476.1804
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 201.13 ft



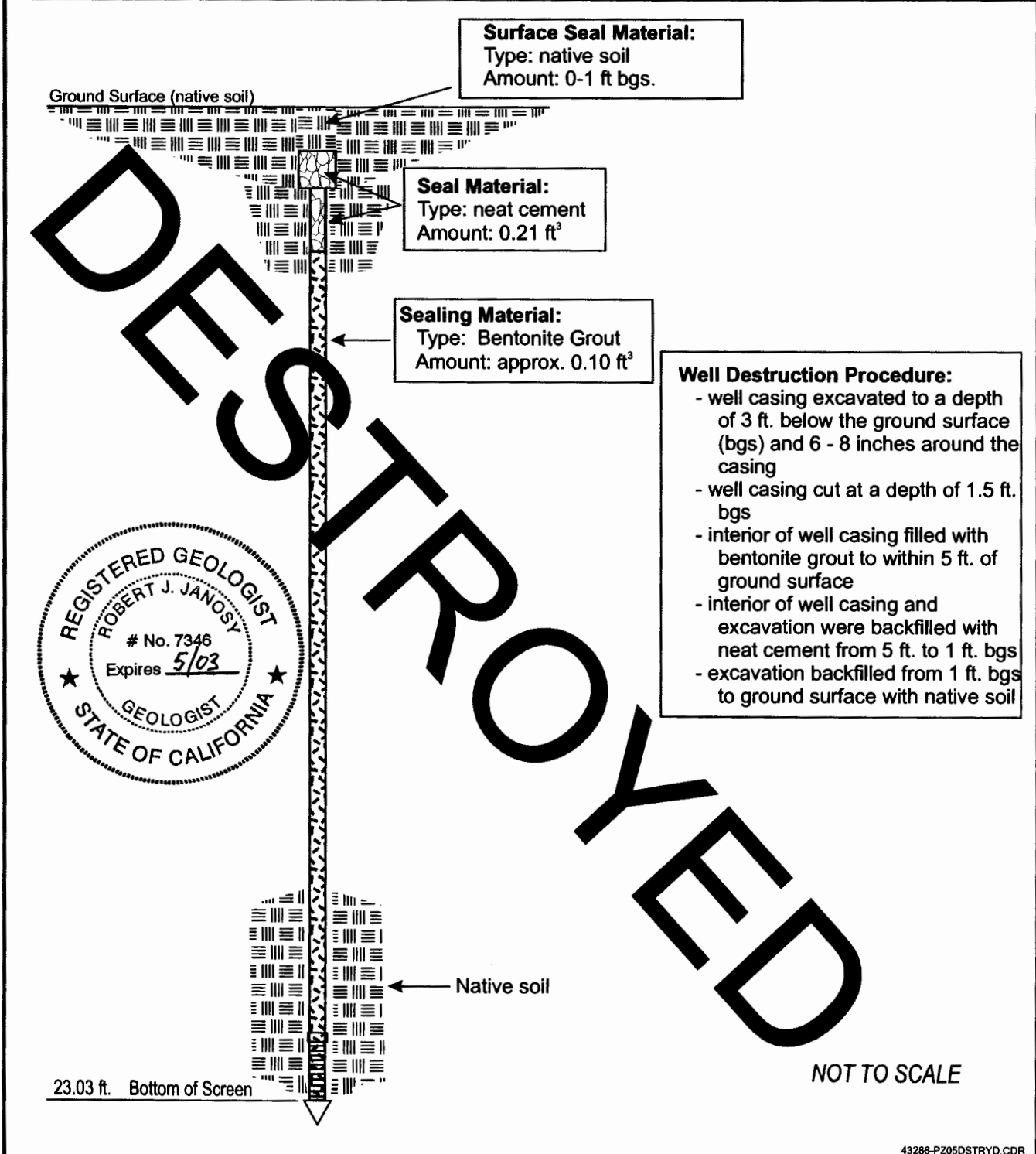
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ04**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069701.0388
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/10/99 Date Destroyed: 11/04/02	Easting: 6207475.2866
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 198.57 ft



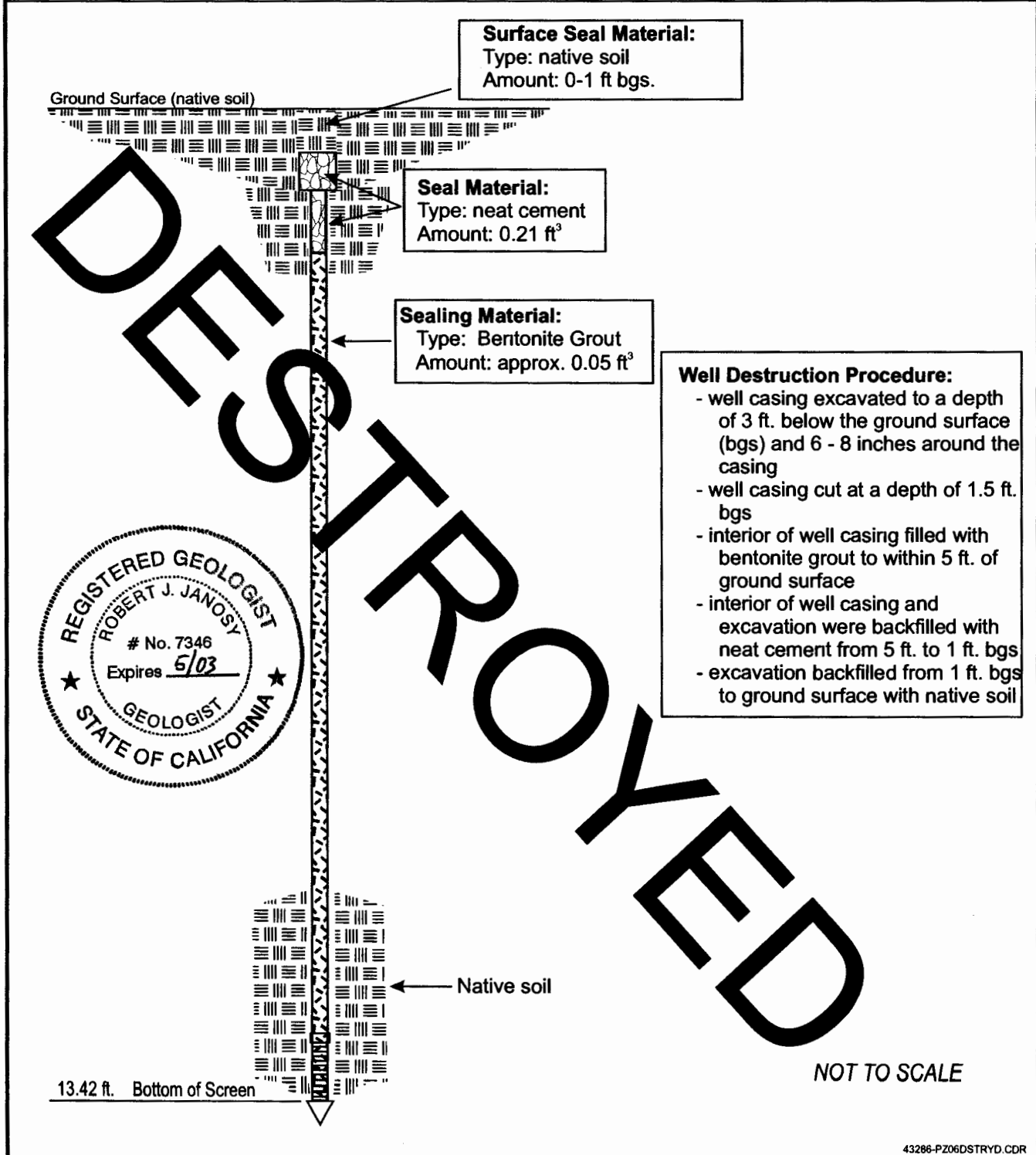
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ05**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069673.4169
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/11/99 Date Destroyed: 11/04/02	Easting: 6207554.9600
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 205.62 ft



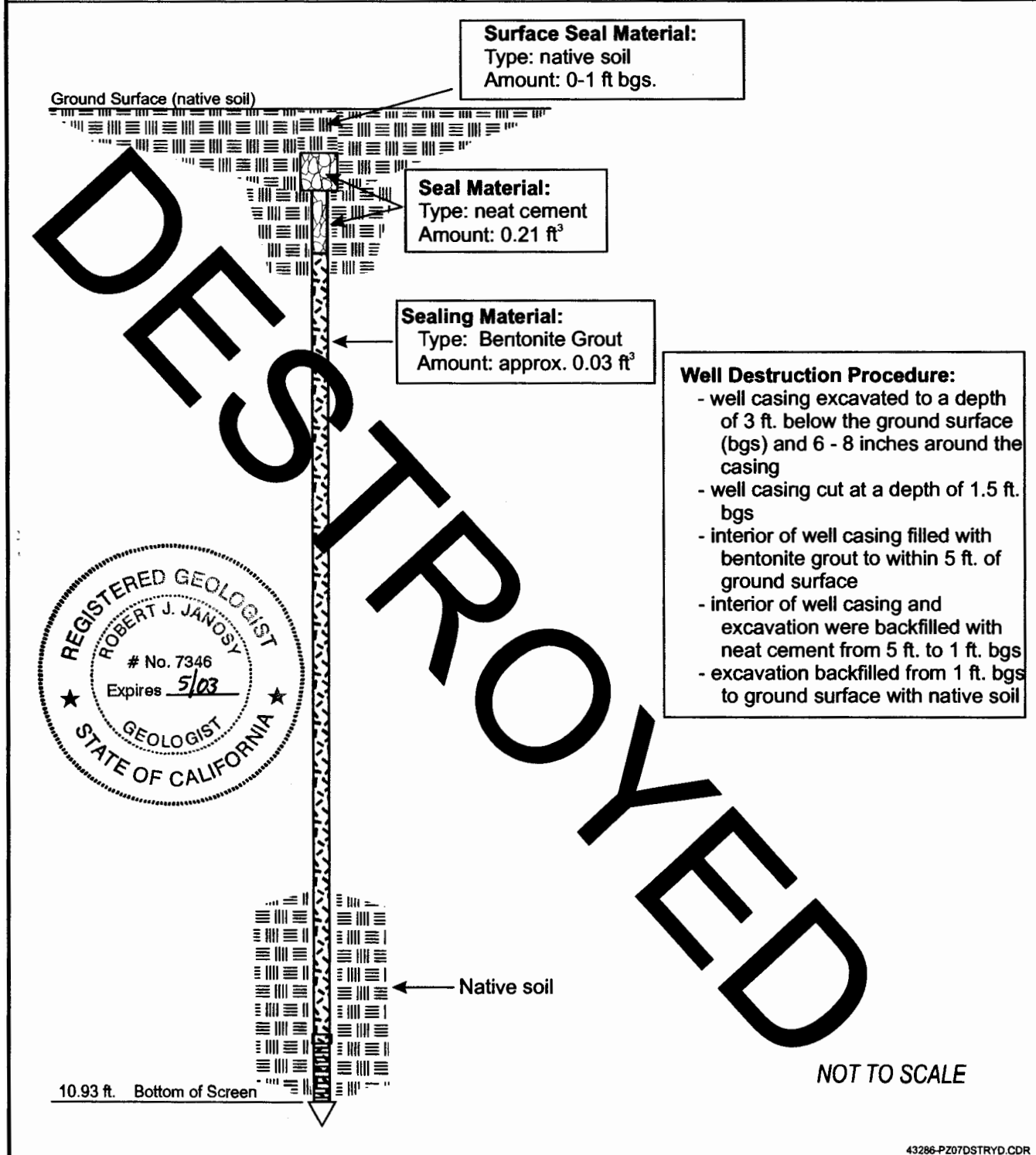
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ06**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069790.2115
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/11/99 Date Destroyed: 11/04/02	Easting: 6207505.7156
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 204.59 ft



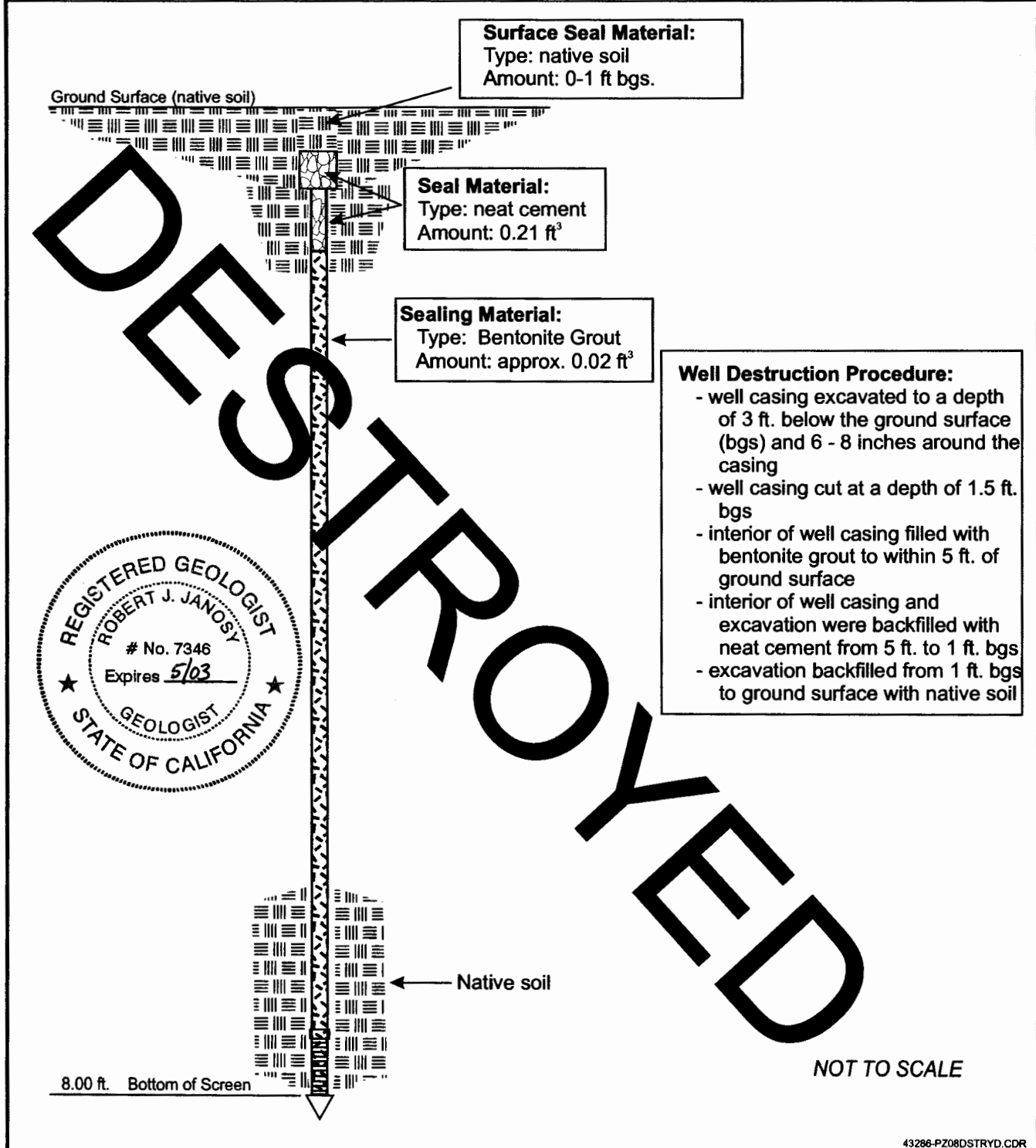
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ07**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069706.5965
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/11/99 Date Destroyed: 11/04/02	Easting: 6207424.8238
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 200.37 ft



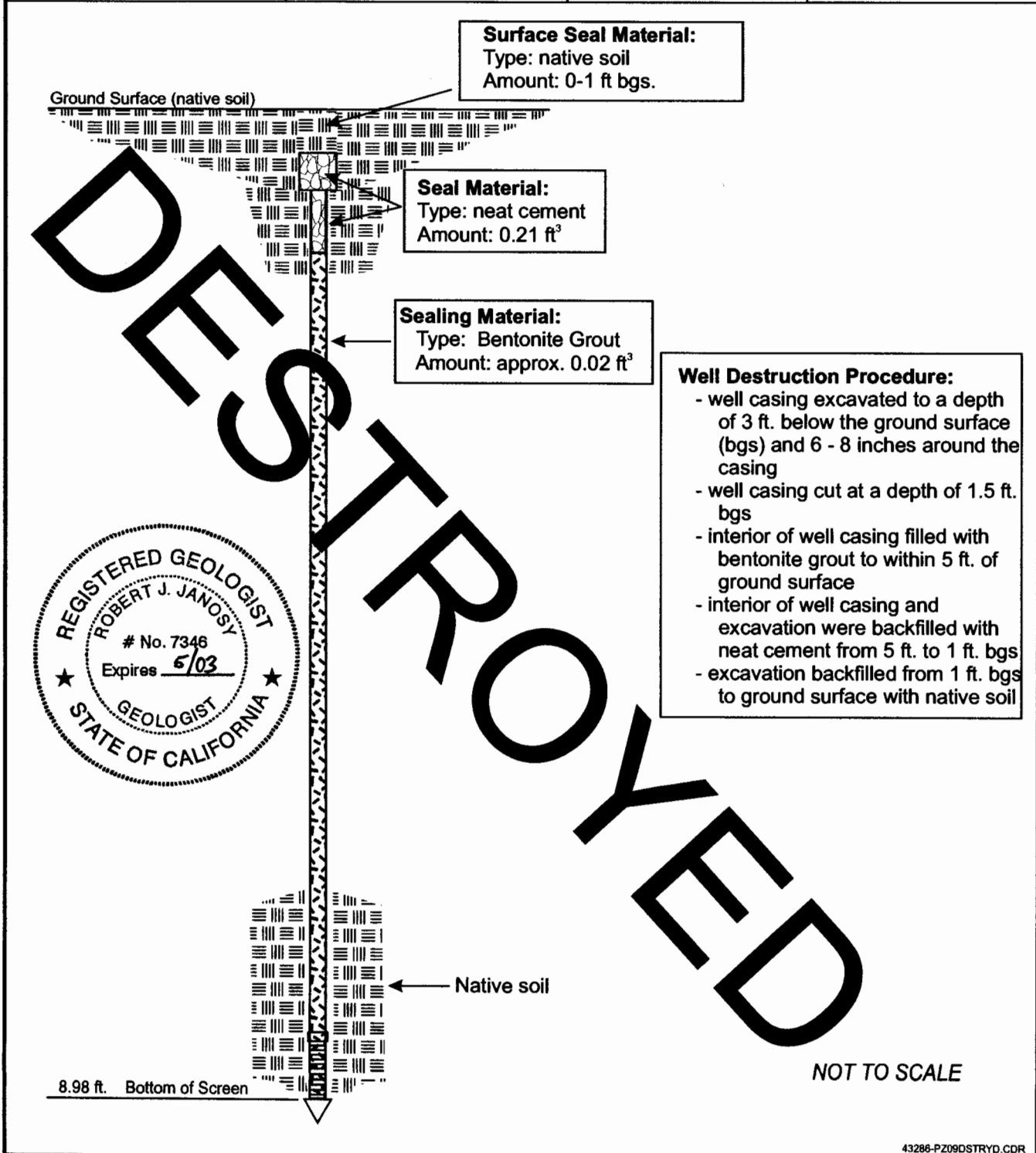
**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ08**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069652.6398
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/11/99 Date Destroyed: 11/04/02	Easting: 6207382.3192
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 196.46 ft



**MCB CAMP PENDLETON
PIEZOMETER
DESTRUCTION DIAGRAM
43286-PZ09**

Project #: G486031	Site: MCB Camp Pendleton	Well Permit Number: W100816	Northing: 2069798.5699
Drilling Contractor: West Hazmat Drilling Corp.	Rig Type and Drilling Method: CME 75 HSA	Date Installed: 02/12/99 Date Destroyed: 11/04/02	Easting: 6207415.4662
Reviewed by: R. Janosy	Driller: Rick Hastings	Geologist: David Conner	Surface Elevation: 202.03 ft



APPENDIX B

DOCUMENTATION OF VERIFICATION SOIL SAMPLING

ANALYTICAL DATA

Billing Information:

Name Gerald Tompkins
Address 505 King Avenue
City, State, Zip Columbus, OH 43201
Phone Number 614-424-4849 Fax 614-424-3667

LABORATORY

Name ALAIA ANALYTICAL
Address SPARKS, NV
Phone

Page # 1 of 1

Client Name		Battelle Memorial Institute		P.O. # CALL BOB		D.O. 115		Analyses Required						DATA REPORT																		
Address		505 King Avenue		PWS #		DWR #								NEND																		
City, State, Zip		Columbus, OH 43201		Phone # 614-424-7160		Fax # 614-458-7160								NENDS FORMAT (NIRS)																		
Time Sampled		Date Sampled		Matrix* See Key Below		Office Use Only		Sampled by B. JANDS		Report Attached		Total and type of containers **See below		Other: VOC* see below		Other: TDS, AIK		Other: TOC		Other: Pb, Mn, Fe, SO ₄		Other: NO ₂ , NO ₃ , SO ₄		Other: TP/P		Other: TP/H		Other: TP/H-G		REMARKS		
1235	12/25	SO	614-458-7160	01	43286-SV2							4																			4°C RG	
1435	12/2	SO	614-458-7160	02	43286-SV1							4																			12-3-05 10:05	
1330	12/2	SO	614-458-7160	03	43286-SV3							4																				
1335	12/2	SO	614-458-7160	04	43286-SV4							4																				
		NA			TEMP BLANK																											

Billing Information :

Battelle
505 King Avenue

Columbus, OH 43201

Client:

Battelle Memorial Institute
505 King Avenue

Columbus, OH 43201

Report Attention : Bob Janosy

CC Report :

Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

Bob Janosy

TEL : (614) 424-7160 x

FAX : (614) 424-3667

E-Mail : janosyr@battelle.org

Job : TO115-43286

PO : Call Bob

Client's COC # : none

Sampled by : Client

Cooler Temp : °C

Date Printed:

14-Dec-05

WorkOrder : BMI05120506

Report Due By : 5:00 PM On : 13-Dec-05

Amendment due: 12/28/05

EDD Required : Yes

QC Level : DS3 = DOD QC Required : Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles			Requested Tests				Sample Remarks	
				ORG	SUB	TAT	PWS #	TPHP_s	VOC_s	VOC_w		
BMI05120506-01A	43286-SV2	SO	12/02/05 12:35	1	0	7		GAS-C	BTXE/MTBE _C			
BMI05120506-02A	43286-SV1	SO	12/02/05 14:35	1	0	7		GAS-C	BTXE/MTBE _C	SPLP (BTX & MTBE)		
BMI05120506-03A	43286-SV3	SO	12/02/05 13:30	1	0	7		GAS-C	BTXE/MTBE _C			
BMI05120506-04A	43286-SV4	SO	12/02/05 11:35	1	0	7		GAS-C	BTXE/MTBE _C			

Comments:

No security seals, frozen ice. Saturday delivery, samples kept @4°C until log in 12-5-05. Temp Blank#5567 rec'd @4°C. Samples should be used as the control spike sample if possible. Level IV QC.
Amended 12/12/05 per Randy- changed to 7 day TAT. : Amended 12/14/05 per Bob Janosy to add SPLP for BTX & MTBE to -02. LE

Logged in by:

Signature

Print Name

Company

Date/Time

Patricia Edrosa Patricia Edrosa Alpha Analytical, Inc. 12/14/05 7:32

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201

Attn: Bob Janosy
Phone: (614) 424-7160
Fax: (614) 424-3667
Date Received : 12/03/05

Job#: TO115-43286

Volatile Organic Compounds (VOCs) EPA Method SW8260B

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	43286-SV1					
Lab ID :	BMI05120506-02A					
		Methyl tert-butyl ether (MTBE)	ND	0.50 µg/L	12/02/05	12/22/05
		Benzene	ND	0.50 µg/L	12/02/05	12/22/05
		Toluene	ND	0.50 µg/L	12/02/05	12/22/05
		Ethylbenzene	ND	0.50 µg/L	12/02/05	12/22/05
		Xylenes, Total	ND	0.50 µg/L	12/02/05	12/22/05
		Surr: 1,2-Dichloroethane-d4	92	%REC	12/02/05	12/22/05
		Surr: Toluene-d8	100	%REC	12/02/05	12/22/05
		Surr: 4-Bromofluorobenzene	82	%REC	12/02/05	12/22/05

This analysis was performed on an SPLP extract.

Note: The sample was analyzed 6 days past the 14-day hold time.

ND = Not Detected

Roger Scholl

Randy Gardner

Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • Randy Gardner, Laboratory Manager • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / info@alpha-analytical.com

PS

12/27/05

Report Date



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Date: 13-Dec-05

Bob Janosy
Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201
(614) 424-7160

CASE NARRATIVE

Project: TO115-43286

Work Order: BMI05120506

Cooler Temp: °C

Alpha's Sample ID	Client's Sample ID	Matrix
05120506-01A	43286-SV2	Soil
05120506-02A	43286-SV1	Soil
05120506-03A	43286-SV3	Soil
05120506-04A	43286-SV4	Soil

Enclosed please find the analytical results of the samples received by Alpha Analytical, Inc. under the above mentioned Work Order/Chain-of-Custody.

Alpha Analytical, Inc. has a formal Quality Assurance/Quality Control program, which is designed to meet or exceed the EPA requirements. All relevant QC met quality assurance objectives for this project unless otherwise stated in the footnotes.

If you have any questions with regards to this report, please contact Randy Gardner, Project Manager, at (800) 283-1183.



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201

Attn: Bob Janosy
Phone: (614) 424-7160
Fax: (614) 424-3667
Date Received : 12/03/05

Job#: TO115/43286

Total Petroleum Hydrocarbons - Purgeable (TPH-P) EPA Method SW8015B/DHS LUFT Manual
Volatile Organic Compounds (VOCs) EPA Method SW8260B

	Parameter	Concentration	Reporting	Date	Date
			Limit	Sampled	Analyzed
Client ID :	TPH Purgeable	ND	1.0 mg/Kg	12/02/05	12/09/05
43286-SV2	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/09/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/09/05
BMI05120506-01A	Toluene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/09/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/09/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/09/05
	Surr: 4-Bromofluorobenzene	94	%REC	12/02/05	12/09/05
Client ID :	TPH Purgeable	7.0	1.0 mg/Kg	12/02/05	12/07/05
43286-SV1	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
BMI05120506-02A	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	18	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	15	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	97	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	95	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05
Client ID :	TPH Purgeable	ND	1.0 mg/Kg	12/02/05	12/07/05
43286-SV3	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
BMI05120506-03A	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Client ID :	TPH Purgeable	39		2.0 mg/Kg	12/02/05	12/07/05
43286-SV4	Methyl tert-butyl ether (MTBE)	ND	V	10 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	V	10 µg/Kg	12/02/05	12/07/05
BMI05120506-04A	Toluene	ND	V	10 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	ND	V	10 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	97		%REC	12/02/05	12/07/05
	Surr: Toluene-d8	95		%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98		%REC	12/02/05	12/07/05

V = Reporting Limits were increased due to high concentrations of target analytes.

ND = Not Detected

Roger Scholl *Randy Gardner* *Walter Hinchman*

Roger L. Scholl, Ph.D., Laboratory Director • Randy Gardner, Laboratory Manager • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / info@alpha-analytical.com

RG

12/13/05

Report Date



Alpha Analytical, Inc.

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(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Date:
13-Dec-05

OC Summary Report

Work Order:
05120506

Method Blank

Type: **MBLK** Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS07\DATA\051207\05120709.D**

Batch ID: **MS07S3657A**

Analysis Date: **12/07/2005 10:24**

Sample ID: **MBLK MS07S3657A**

Units: **µg/Kg**

Run ID: **MSD_07_051207B**

Prep Date: **12/07/2005**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
Methyl tert-butyl ether (MTBE)	ND	5								
Benzene	ND	5								
Toluene	ND	5								
Ethylbenzene	ND	5								
m,p-Xylene	ND	5								
o-Xylene	ND	5								
Surr: 1,2-Dichloroethane-d4	197		200		98	68	119			
Surr: Toluene-d8	191		200		96	84	116			
Surr: 4-Bromofluorobenzene	199		200		99	72	118			

Laboratory Control Spike

Type: **LCS**

Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS07\DATA\051207\05120710.D**

Batch ID: **MS07S3657A**

Analysis Date: **12/07/2005 10:46**

Sample ID: **LCS MS07S3657A**

Units: **µg/Kg**

Run ID: **MSD_07_051207B**

Prep Date: **12/07/2005**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
Methyl tert-butyl ether (MTBE)	410	10	400		102	42	152			
Benzene	407	10	400		102	58	147			
Toluene	403	10	400		101	58	148			
Ethylbenzene	406	10	400		101	59	151			
m,p-Xylene	415	10	400		104	60	155			
o-Xylene	398	10	400		99.6	62	155			
Surr: 1,2-Dichloroethane-d4	392		400		98	68	119			
Surr: Toluene-d8	390		400		98	84	116			
Surr: 4-Bromofluorobenzene	401		400		100	72	118			

Sample Matrix Spike

Type: **MS**

Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS07\DATA\051207\05120720.D**

Batch ID: **MS07S3657A**

Analysis Date: **12/07/2005 14:23**

Sample ID: **05120246-01AMS**

Units: **µg/Kg**

Run ID: **MSD_07_051207B**

Prep Date: **12/07/2005**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
Methyl tert-butyl ether (MTBE)	447	10	400		0 112	23	154			
Benzene	393	10	400		0 98	30	151			
Toluene	387	10	400		0 97	25	159			
Ethylbenzene	402	10	400		0 100	27	161			
m,p-Xylene	432	10	400		0 108	22	170			
o-Xylene	408	10	400		0 102	22	171			
Surr: 1,2-Dichloroethane-d4	385		400		96	68	119			
Surr: Toluene-d8	393		400		98	84	116			
Surr: 4-Bromofluorobenzene	443		400		111	72	118			

Sample Matrix Spike Duplicate

Type: **MSD**

Test Code: **EPA Method SW8260B**

File ID: **C:\HPCHEM\MS07\DATA\051207\05120721.D**

Batch ID: **MS07S3657A**

Analysis Date: **12/07/2005 14:45**

Sample ID: **05120246-01AMSD**

Units: **µg/Kg**

Run ID: **MSD_07_051207B**

Prep Date: **12/07/2005**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
Methyl tert-butyl ether (MTBE)	440	10	400		0 110	23	154	447.3	1.6(48)	
Benzene	378	10	400		0 94	30	151	392.5	3.9(37)	
Toluene	370	10	400		0 92	25	159	387.4	4.7(40)	
Ethylbenzene	378	10	400		0 95	27	161	401.7	6.0(39)	
m,p-Xylene	388	10	400		0 97	22	170	432.5	10.8(40)	
o-Xylene	382	10	400		0 96	22	171	407.9	6.5(41)	
Surr: 1,2-Dichloroethane-d4	390		400		98	68	119			
Surr: Toluene-d8	393		400		98	84	116			
Surr: 4-Bromofluorobenzene	434		400		108	72	118			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.



Alpha Analytical, Inc.

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Date:
13-Dec-05

OC Summary Report

Work Order:
05120506

Method Blank

Type: MBLK Test Code: EPA Method SW8015B/DHS LUFT Manual

File ID: C:\HPCHEM\MS07\DATA\051207\05120709.D

Batch ID: MS07S3657B

Analysis Date: 12/07/2005 10:24

Sample ID: MBLK MS07S3657B

Units : mg/Kg

Run ID: MSD_07_051207B

Prep Date: 12/07/2005

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
TPH Purgeable	ND	1								
Surr: 1,2-Dichloroethane-d4	0.197		0.2		98	68	119			
Surr: Toluene-d8	0.191		0.2		96	84	116			
Surr: 4-Bromofluorobenzene	0.199		0.2		99	72	118			

Laboratory Control Spike

Type: LCS Test Code: EPA Method SW8015B/DHS LUFT Manual

File ID: C:\HPCHEM\MS07\DATA\051207\05120722.D

Batch ID: MS07S3657B

Analysis Date: 12/07/2005 15:07

Sample ID: GLCS MS07S3657B

Units : mg/Kg

Run ID: MSD_07_051207B

Prep Date: 12/07/2005

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
TPH Purgeable	19	2	16		119	60	153			
Surr: 1,2-Dichloroethane-d4	0.394		0.4		99	68	119			
Surr: Toluene-d8	0.377		0.4		94	84	116			
Surr: 4-Bromofluorobenzene	0.396		0.4		99	72	118			

Sample Matrix Spike

Type: MS Test Code: EPA Method SW8015B/DHS LUFT Manual

File ID: C:\HPCHEM\MS07\DATA\051207\05120723.D

Batch ID: MS07S3657B

Analysis Date: 12/07/2005 15:29

Sample ID: 05120246-01AGS

Units : mg/Kg

Run ID: MSD_07_051207B

Prep Date: 12/07/2005

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
TPH Purgeable	37.7	2	16	22	98	8	177			
Surr: 1,2-Dichloroethane-d4	0.392		0.4		98	68	119			
Surr: Toluene-d8	0.379		0.4		95	84	116			
Surr: 4-Bromofluorobenzene	0.409		0.4		102	72	118			

Sample Matrix Spike Duplicate

Type: MSD Test Code: EPA Method SW8015B/DHS LUFT Manual

File ID: C:\HPCHEM\MS07\DATA\051207\05120724.D

Batch ID: MS07S3657B

Analysis Date: 12/07/2005 15:51

Sample ID: 05120246-01AGSD

Units : mg/Kg

Run ID: MSD_07_051207B

Prep Date: 12/07/2005

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPDRefVal	%RPD(Limit)	Qual
TPH Purgeable	36.7	2	16	22	92	8	177	37.74	2.8(45)	
Surr: 1,2-Dichloroethane-d4	0.387		0.4		97	68	119			
Surr: Toluene-d8	0.377		0.4		94	84	116			
Surr: 4-Bromofluorobenzene	0.421		0.4		105	72	118			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

DATA VALIDATION PACKAGE



LABORATORY DATA CONSULTANTS, INC.

7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Battelle
505 King Ave
Columbus, OH 43201-2693
ATTN: Mr. Robert Janosy

January 30, 2006

SUBJECT: MCB Camp Pendleton, CTO 115, Data Validation

Dear Mr. Janosy,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on January 25, 2006. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14559:

<u>SDG #</u>	<u>Fraction</u>
BMI05120506	Volatiles, TPH as Purgeables

The data validation was performed under EPA Level III and IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

Please feel free to contact us if you have any questions.

Sincerely,

Erlinda T. Rauto
Operations Manager/Senior Chemist

10/90

LDC #14559 (Battelle-Columbus OH / MCB Camp Pendleton, CTO 115)

[illegible]

Shaded cells indicate Level IV validation (all other cells are Level III validation).

MCB Camp Pendleton, CTO 115
Data Validation Reports
LDC# 14559

Volatiles

DDC

**Laboratory Data Consultants, Inc.
Data Validation Report**

Project/Site Name: Camp Pendleton, CTO 115

Collection Date: December 2, 2005

LDC Report Date: January 27, 2006

Matrix: Soil

Parameters: Volatiles

Validation Level: EPA Level III & IV

Laboratory: Alpha Analytical, Inc.

Sample Delivery Group (SDG): BMI05120506

Sample Identification

43286-SV2

43286-SV1

43286-SV3

43286-SV4**

43286-SV1 SPLP

****Indicates sample underwent EPA Level IV review**

Introduction

This data review covers 5 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UU Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

No field blanks were identified in this SDG.

Camp Pendleton, CTO 115

Volatiles - Data Qualification Summary - SDG BMI05120506

No Sample Data Qualified in this SDG

Camp Pendleton, CTO 115

Volatiles - Laboratory Blank Data Qualification Summary - SDG BMI05120506

No Sample Data Qualified in this SDG



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778

(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201

Attn: Bob Janosy
Phone: (614) 424-7160
Fax: (614) 424-3667
Date Received : 12/03/05

Job#: TO115-43286

Volatile Organic Compounds (VOCs) EPA Method SW8260B

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	43286-SV1					
Lab ID :	BMI05120506-02A	Methyl tert-butyl ether (MTBE)	ND	0.50 µg/L	12/02/05	12/22/05
		Benzene	ND	0.50 µg/L	12/02/05	12/22/05
		Toluene	ND	0.50 µg/L	12/02/05	12/22/05
		Ethylbenzene	ND	0.50 µg/L	12/02/05	12/22/05
		Xylenes, Total	ND	0.50 µg/L	12/02/05	12/22/05
		Surr: 1,2-Dichloroethane-d4	92	%REC	12/02/05	12/22/05
		Surr: Toluene-d8	100	%REC	12/02/05	12/22/05
		Surr: 4-Bromofluorobenzene	82	%REC	12/02/05	12/22/05

This analysis was performed on an SPLP extract.

Note: The sample was analyzed 6 days past the 14-day hold time.

ND = Not Detected

Roger Scholl

Randy Gardner

Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • Randy Gardner, Laboratory Manager • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / info@alpha-analytical.com

[Signature]

12/27/05

Report Date

1/30/06



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201

Attn: Bob Janosy
Phone: (614) 424-7160
Fax: (614) 424-3667
Date Received : 12/03/05

Job#: TO115/43286

Total Petroleum Hydrocarbons - Purgeable (TPH-P) EPA Method SW8015B/DHS LUFT Manual
Volatile Organic Compounds (VOCs) EPA Method SW8260B

	Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	TPH Purgeable	ND	1.0 mg/Kg	12/02/05	12/09/05
43286-SV2	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/09/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/09/05
BMI05120506-01A	Toluene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/09/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/09/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/09/05
	Surr: 4-Bromofluorobenzene	94	%REC	12/02/05	12/09/05
Client ID :	TPH Purgeable	2.0	1.0 mg/Kg	12/02/05	12/07/05
43286-SV1	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
BMI05120506-02A	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	18	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	15	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	97	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	95	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05
Client ID :	TPH Purgeable	ND	1.0 mg/Kg	12/02/05	12/07/05
43286-SV3	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
BMI05120506-03A	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778

(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Client ID :	TPH Purgeable	39		2.0 mg/Kg	12/02/05	12/07/05
43286-SV4	Methyl tert-butyl ether (MTBE)	ND	V	10 µg/Kg	12/02/05	12/07/05
Lab ID :	Benzene	ND	V	10 µg/Kg	12/02/05	12/07/05
BMI05120506-04A	Toluene	ND	V	10 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	ND	V	10 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	97		%REC	12/02/05	12/07/05
	Surr: Toluene-d8	95		%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98		%REC	12/02/05	12/07/05

V = Reporting Limits were increased due to high concentrations of target analytes.

ND = Not Detected

Roger Scholl

Randy Gardner

Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • Randy Gardner, Laboratory Manager • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / info@alpha-analytical.com

RS

12/13/05

Report Date

1/20/06

LDC #: 14559A1

VALIDATION COMPLETENESS WORKSHEET

SDG #: BMI05120506

Level III/IV

Laboratory: Alpha Analytical, Inc.

Date: 1/27/06

Page: 6f

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS Volatiles (BTEX)(EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/2/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD, r^2 30.990
IV.	Continuing calibration	A	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	chint specified
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Level III validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Level III validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Level III validation. not reported
XIV.	System performance	A	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected D = Duplicate
R = Rinsate TB = Trip blank
FB = Field blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

1	43286-SV2	11	MBLK MS07S3057A	31	
2	43286-SV1	12	2 MBLK MS07W1221C	32	
3	43286-SV3	13		23	33
4	43286-SV4**	14		24	34
5	43286-SV1 SPLP	15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

LDC #: 14559A1
SDG #: B B B M | 05 | 20506

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples analyzed within the 12 hour clock criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a curve fit used for evaluation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) > 0.05?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
V. Blanks				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil // Water.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Was a MS/MSD analyzed every 20 samples of each matrix?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 14559A1
SDG #: B M | 05 | 20506

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were the performance evaluation (PE) samples within the acceptance limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were retention times within + 30 seconds of the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XI. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were chromatogram peaks verified and accounted for?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were relative intensities of the major ions within $\pm 20\%$ between the sample and the reference spectra?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
XIV. System performance				
System performance was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field duplicates.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
XVII. Field blanks				
Field blanks were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field blanks.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

LDC #: 14559A
SDG #: BM105120506

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: PN
2nd Reviewer: 2

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_s)(C_u)/(A_u)(C_s)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_s = Area of compound,

C_s = Concentration of compound,

S = Standard deviation of the RRFs

X = Mean of the RRFs

A_u = Area of associated internal standard

C_u = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (<u>32</u> std)	RRF (<u>32</u> std)	Average RRF (Initial)	Average RRF (Initial)	%RSD	%RSD
1	KAL	12/8/05	Methylene chloride (1st internal standard)	4.996	4.996	4.367	4.367	13.8	13.8
			Trichloroethene (2nd internal standard)	3.542	3.542	3.711	3.711	7.3	7.3
			Toluene (3rd internal standard)						
2			Methylene chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Toluene (3rd internal standard)						
3			Methylene chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Toluene (3rd internal standard)						
4			Methylene chloride (1st internal standard)						
			Trichloroethene (2nd internal standard)						
			Toluene (3rd internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 14559A1
SDG #: BM105120506

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$

RRF = $(A_x)(C_s) / (A_s)(C_x)$

Where: ave. RRF = Initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_s = Area of associated internal standard

C_s = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported	Recalculated	Reported	Recalculated
					RRF (CC)	RRF (CC)	%D	%D
1	05120706	12/7/05	MTBE Methylene chloride (1st internal standard)	0.437	0.421	0.421	3.7	3.7
	CCV		TOLUENE Trichlorethene (2nd internal standard)	3.711	3.825	3.825	3.1	3.1
			Toluene (3rd internal standard)					
2			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
3			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
4			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 14559 A1
 SDG #: BM105120506

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
 Reviewer: FL
 2nd reviewer: g

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: $SF/SS \times 100$

Where: SF = Surrogate Found
 SS = Surrogate Spiked

Sample ID: 4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	400	379.27	95	95	0
Bromofluorobenzene	↓	392.66	98	98	↓
1,2-Dichloroethane-d4	↓	387.79	97	97	↓
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

LDC #: 1459A1
 SDG #: BM/OS/20506

VALIDATION FINDINGS WORKSHEET **Laboratory Control Sample Results Verification**

Page: 1 of 1
 Reviewer: B
 2nd Reviewer: R

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * SSC/SA

Where: SSC = Spiked sample concentration
 SA = Spike added

RPD = $|LCS - LCSD| * 2 / (LCS + LCSD)$

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: LCS - MS073657A

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene										
Trichloroethene										
Benzene <u>ug/kg</u>	400	NA	407	NA	102	102				
Toluene <u>ug/kg</u>	400	↓	403	↓	101	101	NA			
Chlorobenzene <u>TPH mg/kg</u>	16	↓	19	↓	119	119				
<u>purgeable</u>										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

MCB Camp Pendleton, CTO 115
Data Validation Reports
LDC# 14559

TPH as Purgeables

LDC

**Laboratory Data Consultants, Inc.
Data Validation Report**

Project/Site Name: Camp Pendleton, CTO 115
Collection Date: December 2, 2005
LDC Report Date: January 27, 2006
Matrix: Soil
Parameters: Total Petroleum Hydrocarbons as Purgeables
Validation Level: EPA Level III & IV
Laboratory: Alpha Analytical, Inc.
Sample Delivery Group (SDG): BMI05120506

Sample Identification

43286-SV2
43286-SV1
43286-SV3
43286-SV4**

****Indicates sample underwent EPA Level IV review**

Introduction

This data review covers 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Total Petroleum Hydrocarbons (TPH) as Purgeables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent a EPA Level IV review. A EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 25.0% for all compounds.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as purgeable contaminants were found in the method blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was within validation criteria for samples on which a EPA Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

XVII. Field Blanks

No field blanks were identified in this SDG.

Camp Pendleton, CTO 115

Total Petroleum Hydrocarbons as Purgeables - Data Qualification Summary - SDG BMI05120506

No Sample Data Qualified in this SDG

Camp Pendleton, CTO 115

Total Petroleum Hydrocarbons as Purgeables - Laboratory Blank Data Qualification Summary - SDG BMI05120506

No Sample Data Qualified in this SDG



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Battelle Memorial Institute
505 King Avenue
Columbus, OH 43201

Attn: Bob Janosy
Phone: (614) 424-7160
Fax: (614) 424-3667
Date Received : 12/03/05

Job#: TO115/43286

Total Petroleum Hydrocarbons - Purgeable (TPH-P) EPA Method SW8015B/DHS LUFT Manual
Volatile Organic Compounds (VOCs) EPA Method SW8260B

	Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID : 43286-SV2 Lab ID : BMI05120506-01A	TPH Purgeable	ND <i>u</i>	1.0 mg/Kg	12/02/05	12/09/05
	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/09/05
	Benzene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Toluene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/09/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/09/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/09/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/09/05
	Surr: 4-Bromofluorobenzene	94	%REC	12/02/05	12/09/05
Client ID : 43286-SV1 Lab ID : BMI05120506-02A	TPH Purgeable	7.0	1.0 mg/Kg	12/02/05	12/07/05
	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	18	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	15	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	97	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	95	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05
Client ID : 43286-SV3 Lab ID : BMI05120506-03A	TPH Purgeable	ND <i>u</i>	1.0 mg/Kg	12/02/05	12/07/05
	Methyl tert-butyl ether (MTBE)	ND	5.0 µg/Kg	12/02/05	12/07/05
	Benzene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Toluene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Ethylbenzene	ND	5.0 µg/Kg	12/02/05	12/07/05
	m,p-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	o-Xylene	ND	5.0 µg/Kg	12/02/05	12/07/05
	Surr: 1,2-Dichloroethane-d4	98	%REC	12/02/05	12/07/05
	Surr: Toluene-d8	97	%REC	12/02/05	12/07/05
	Surr: 4-Bromofluorobenzene	98	%REC	12/02/05	12/07/05



Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778

(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

Client ID :

43286-SV4

Lab ID :

BMI05120506-04A

TPH Purgeable	39		2.0 mg/Kg	12/02/05	12/07/05
Methyl tert-butyl ether (MTBE)	ND	V	10 µg/Kg	12/02/05	12/07/05
Benzene	ND	V	10 µg/Kg	12/02/05	12/07/05
Toluene	ND	V	10 µg/Kg	12/02/05	12/07/05
Ethylbenzene	ND	V	10 µg/Kg	12/02/05	12/07/05
m,p-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
o-Xylene	ND	V	10 µg/Kg	12/02/05	12/07/05
Surr: 1,2-Dichloroethane-d4	97		%REC	12/02/05	12/07/05
Surr: Toluene-d8	95		%REC	12/02/05	12/07/05
Surr: 4-Bromofluorobenzene	98		%REC	12/02/05	12/07/05

V = Reporting Limits were increased due to high concentrations of target analytes.

ND = Not Detected

Roger Scholl

Randy Gardner

Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • Randy Gardner, Laboratory Manager • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / info@alpha-analytical.com

RG

12/13/05

Report Date

LDC #: 14559A7

VALIDATION COMPLETENESS WORKSHEET

SDG #: BMI05120506

Level III/IV

Laboratory: Alpha Analytical, Inc.

Date: 1/26/06

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS TPH as Purgeables (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 12/2/05
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD ≤ 30
IV.	Continuing calibration	A	% D ≤ 25
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	chint specified
VIII.	Laboratory control samples	A	LC5
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Level III validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Level III validation.
XIII.	Tentitatively identified compounds (TICs)	N	Not reviewed for Level III validation. not reported
XIV.	System performance	A	Not reviewed for Level III validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected D = Duplicate
R = Rinsate TB = Trip blank
FB = Field blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

SOIL

1	43286-SV2	11	MBLK NS0752457B	31	
2	43286-SV1	12		32	
3	43286-SV3	13		33	
4	43286-SV4**	14		34	
5		15		35	
6		16		36	
7		17		37	
8		18		38	
9		19		39	
10		20		40	

LDC #: 14559A7
SDG #: B M105120506

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: B
2nd Reviewer: J

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples analyzed within the 12 hour clock criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a curve fit used for evaluation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Did the initial calibration meet the curve fit acceptance criteria of > 0.990 ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were all percent relative standard deviations (%RSD) $\leq 30\%$ and relative response factors (RRF) > 0.05 ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) $\leq 25\%$ and relative response factors (RRF) ≥ 0.05 ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
V. Blanks				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Was a MS/MSD analyzed every 20 samples of each matrix?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 14559A7
SDG #: BM/05/20506

VALIDATION FINDINGS CHECKLIST

Page 2 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were the performance evaluation (PE) samples within the acceptance limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were retention times within + 30 seconds of the associated calibration standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XI. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were chromatogram peaks verified and accounted for?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XIII. Tentatively Identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were relative intensities of the major ions within $\pm 20\%$ between the sample and the reference spectra?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
XIV. System performance				
System performance was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field duplicates.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
XVII. Field blanks				
Field blanks were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target compounds were detected in the field blanks.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

LDC #: 14559A7
SDG #: BM105120506

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs

X = Mean of the RRFs

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (400 std)	RRF (400 std)	Average RRF (Initial)	Average RRF (Initial)	%RSD	%RSD
1	MS07 ICAL	12/2/05	TPH purgeable Methylene chloride (1st internal standard)	2.033	2.033	1.907	1.907	8.7	8.7
			Trichlorethene (2nd internal standard)						
			Toluene (3rd internal standard)						
2			Methylene chloride (1st internal standard)						
			Trichlorethene (2nd internal standard)						
			Toluene (3rd internal standard)						
3			Methylene chloride (1st internal standard)						
			Trichlorethene (2nd internal standard)						
			Toluene (3rd internal standard)						
4			Methylene chloride (1st internal standard)						
			Trichlorethene (2nd internal standard)						
			Toluene (3rd internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 14559A7
SDG #: B M 105120506

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$
 $\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$

Where: ave. RRF = Initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported	Recalculated	Reported	Recalculated
					RRF (CC)	RRF (CC)	%D	%D
1	05120707	12/7/05	TPH purgeable Methylene chloride (1st internal standard)	1.907	2.311	2.311	21.2	21.2
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
2			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
3			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					
4			Methylene chloride (1st internal standard)					
			Trichlorethene (2nd internal standard)					
			Toluene (3rd internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 14559A7
 SDG #: BM105120506

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
 Reviewer: B
 2nd reviewer: J

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: $SF/SS \times 100$

Where: SF = Surrogate Found
 SS = Surrogate Spiked

Sample ID: 4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	400	379.27	95	95	0
Bromofluorobenzene	↓	392.66	98	98	↓
1,2-Dichloroethane-d4		387.79	97	97	
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

LDC #: 14559A7
SDG #: BM/OS/20506

VALIDATION FINDINGS WORKSHEET **Laboratory Control Sample Results Verification**

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * SSC/SA$

Where: SSC = Spiked sample concentration
SA = Spike added

RPD = $|LCS - LCSD| * 2 / (LCS + LCSD)$

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS ID: GLCS M50753657B

Compound	Spike Added (mg/kg)		Spiked Sample Concentration (mg/kg)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene										
Trichloroethene										
Benzene										
Toluene										
Chlorobenzene										
TPH purgeable	16	NA	19	NA	119	119	NA			

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y N N/A

Were all reported results recalculated and verified for all level IV samples?

Y: N N/A

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_s)(I_s)(DF)}{(A_r)(RRF)(V_r)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_0 = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. #4, TPH: purgeable

$$\text{Conc.} = \frac{(154631630)(19)(40)}{(808257)(1.907)(1000)}$$

40 mg/kg

[illegible]

SITE 43286 PLOT MAP

